



College of Professional Studies

The PhD Program

The Impact of Trade Openness and Investment-Related Factors on GDP per Capita in Egypt: A
Quantitative Analysis from 1977 to 2023

By

Shahub Tossi

Submitted in Partial Fulfillment of the Requirements for the Degree in

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Abstract

This study examined how gross capital formation, personal remittances, foreign direct investment (FDI), exports, and imports predicted GDP per capita in Egypt from 1977 to 2023. While all five variables were expected to contribute positively to income growth, consistent with modernization theory and much of the development literature, the results revealed a more complex reality. The primary multiple linear regression model found that gross capital formation and exports were significant negative predictors of GDP per capita, whereas FDI was positively associated. Personal remittances and imports were statistically insignificant when all variables were considered together. These findings highlight the importance of analyzing economic inputs within Egypt's distinct institutional and structural context, rather than relying on universal models or surface-level assumptions. Grounded in modernization theory and investment-led growth frameworks, the study employed a quantitative, non-experimental longitudinal design using data from the World Bank's World Development Indicators. Descriptive statistics and five simple linear regression models were used to assess each independent variable individually, followed by a multiple regression model to evaluate their combined influence. Two supplementary models tested the robustness of the primary model by excluding non-significant predictors. The final model explained approximately 71.5% of the variance in GDP per capita (Adjusted $R^2 = .715$, $p < .001$), indicating a strong model fit. Policy implications and directions for future research are discussed.

Keywords: Egypt, GDP per capita, economic growth, foreign direct investment, trade, remittances, gross capital formation

Chapter One

The Problem and its Setting

Introduction

As of 2023, Egypt's gross domestic product (GDP) per capita was estimated at approximately \$3,300 per year, an amount significantly lower than the regional average for the Middle East and North Africa (MENA), which was around \$6,100, and the global average of approximately \$13,600 (World Bank, n.d.-a). This disparity underscores a persistent developmental challenge: how to foster sustained economic growth in a nation with a population of approximately 116,500,000 (World Bank, n.d.-b) and a strategic geographical position such as Egypt. Economic growth has long drawn scholarly attention and policy debates, particularly in developing countries where raising living standards through effective resource allocation is a critical priority to combat poverty. It is critical to note that GDP per capita remains a key indicator for the standard of living of people living within a nation (Ilter, 2017). Policymakers and researchers must examine and assess the drivers of GDP per capita to effectively stimulate growth, reduce structural imbalances, and guide long-term developmental strategies. Prior studies often concentrated on cross-country analyses or shorter time frames that did not fully capture the interplay among multiple variables such as gross capital formation, foreign direct investment (FDI), personal remittances, exports, and imports across Egypt's unique historical and economic fluctuations (Abd El-Fattah, 2019; Abou Ltaif et al., 2024; Kircicek & Ozparlak, 2023).

Egypt presented a compelling case for in-depth economic analysis, having undertaken significant policy reforms and experienced multiple revolutions and periods of political upheaval since the 1970s. The country transitioned from President Nasser's model of centralized planning, which emphasized state-led development and social welfare, to President Sadat's economic liberalization through the Open Door Policy (Infitah) in the 1970s (Hamed, 1981). This trajectory continued under President Mubarak, whose implementation of the Economic Reform and Structural Adjustment Program (ERSAP) in the 1990s aimed to stabilize macroeconomic conditions, stimulate private sector growth, and attract foreign investment. However, these reforms also contributed to rising inequality and the erosion of the welfare state, ultimately fueling discontent that culminated in the 2011 uprising. Under President Sisi, Egypt has maintained a neoliberal policy orientation, focusing on structural reforms intended to address deep-rooted socioeconomic disparities (Mansour, 2020). Nonetheless, persistent challenges—such as inflation, inadequate infrastructure, uneven institutional capacity, and regional instability—continue to hinder progress (Sharaf, 2015). Identifying the economic variables most strongly associated with GDP per capita was therefore essential to informing strategies for overcoming these enduring structural constraints.

Investment- and trade-related factors play a critical role in shaping economic outcomes. Gross Capital Formation (GCF) facilitates infrastructure development and economic diversification (Abdulsahib, 2024). Meanwhile, Rezk et al. (2022) found that Foreign Direct Investment (FDI) contributed to economic growth and reduced income inequality by introducing capital inflows and fostering inclusive development from 1975 to 2017. It is also critical to note that personal remittances supplement domestic savings, contributing to consumption, education, and healthcare expenditures. Simultaneously, trade variables such as exports and imports

demonstrate the degree of openness of an economy, international competitiveness, and the capacity to absorb foreign technology (Youssef, 2023).

Several gaps persisted in the existing scholarship. Many studies employed multinational frameworks as opposed to singularly focusing on one nation, thus overlooking the long-term effects of major policy interventions such as the Open Door Policy and ERSAP on GDP per capita (Devender, 2022; Emako et al., 2022; Greenaway et al., 2002). Many cross-national studies also neglected country-specific institutional, demographic, and geopolitical factors that could have mediated the relationship between trade openness, investment flows, and economic growth. This study aimed to address such shortcomings by focusing on a comprehensive period, 1970 through 2023, in the form of a multivariate analysis, and revealed how certain predictors impacted GDP per capita. Including a longer historical window allowed this study to examine multiple policy shifts, global economic fluctuations, and domestic developments that shaped Egypt's economic growth patterns.

The purpose of this study was to examine the relationship between GDP per capita and five key economic indicators, gross capital formation, personal remittances, foreign direct investment, exports, and imports, in Egypt from 1977 to 2023. This study employed a comprehensive quantitative approach, allowing the researcher to identify the extent to which these investment- and trade-related variables collectively predicted changes in GDP per capita. In doing so, the study addressed existing gaps in the literature by utilizing an extended historical dataset, analyzing multiple variables in conjunction and isolation, and focusing exclusively on Egypt's unique context.

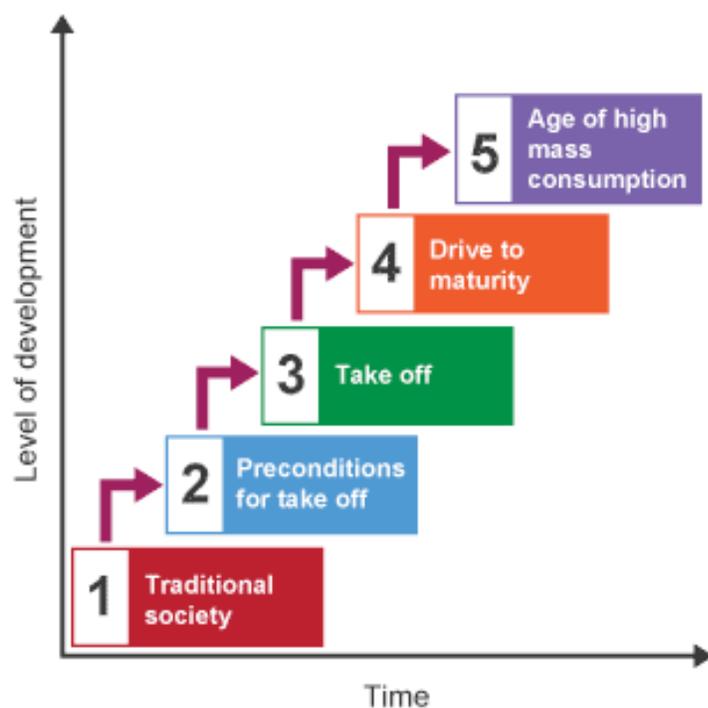
Theoretical Framework

Modernization Theory served as the guiding framework for this study. This theory offers an interdisciplinary perspective on the relationship between economic growth, institutional reform, and societal transformation. Modernization Theory argues that long-term economic development requires a nation to prioritize modernizing economic, social, and institutional structures (Lipset, 1959; Rostow, 1960). As societies transition from traditional agrarian economies to industrialized societies, institutional reforms act as catalysts to facilitate growth, enhance productivity, and foster global integration.

Modernization Theory gained prominence in the mid-20th century as scholars aimed to explain the economic success of Western nations and provide a framework for developing economies as a model for similar growth trajectories. Rostow (1960) outlined five stages of economic growth through which countries transition as they move from traditional societies to advanced industrial economies. These stages include: traditional society, preconditions for takeoff, takeoff, drive to maturity, and the age of high mass consumption. Complementing Rostow's (1960) five-stage model, Lipset (1959) demonstrated the interdependence between economic growth and democratic stability, underscoring that higher levels of education, wealth, and industrialization support the legitimacy and strength of democratic systems. Deutsch (1961) further developed Modernization Theory by emphasizing that social mobilization, which tends to accompany economic development, generates new social pressures that must be met with institutional adjustment. Without timely and responsive reforms, these emerging demands can overwhelm political systems and threaten stability. The findings of this study provided empirical insights into the role of the aforementioned factors in Egypt's economic development trajectory.

Figure 1***Rostow's Five Stages of Economic Growth***

Figure 1 below visually represents Rostow's (1960) Five Stages of Economic Growth model. This framework illustrates the progression of societies from the Traditional Society stage, characterized by agrarian economies with minimal technological advancement, to the Age of High Mass Consumption, where nations become industrialized with the presence of robust consumer-driven markets. The framework offers a structured view of economic development over a temporal scale by outlining each intermediate stage—Preconditions for Takeoff, Takeoff, and Drive to Maturity. This framework provided a practical lens for analyzing Egypt's economic trajectory, as the variables examined in this dissertation—GDP per capita, gross capital formation, personal remittances, foreign direct investment, exports, and imports—reflected key aspects of Rostow's stages, particularly the role of investment and trade in facilitating economic takeoff and long-term growth.



Conceptual Framework

Guided by Modernization Theory, this study analyzed the relationship between institutional reforms, domestic investment, trade openness, and GDP per capita growth in Egypt from 1977 to 2023. The conceptual framework of this study identified three core components: investment, trade openness, and economic growth. Institutional modernization reflected the reforms necessary to support market liberalization, encourage investment, and promote technological adoption. Trade openness promoted global knowledge diffusion, foreign investment attraction, and market expansion. GDP per capita served as the dependent variable, capturing Egypt's economic standard of living through efforts of modernization-driven growth. The variables included in this study aligned with Modernization Theory's core principles, as trade openness has been empirically shown to have a positive causal effect on income per capita (Frankel & Romer, 1999). The study categorized key variables into two groups: investment-related variables and trade-related variables.

Investment-related variables included gross capital formation, foreign direct investment (FDI), and personal remittances in the study. In the economic literature, gross capital formation is widely regarded as representing domestic investments in infrastructure, machinery, and productive assets, elements essential for expanding production capacity and enhancing operational efficiency. This aligns with Rostow's Preconditions for the Takeoff stage, which emphasizes the role of investment in initiating sustained economic growth (Rostow, 1960). FDI is often identified as a key source of capital that facilitates the transfer of technology and managerial expertise, particularly in countries with adequate levels of human capital to absorb and implement these innovations (Borensztein et al., 1998). Additionally, personal remittances are frequently cited as playing a significant role in reducing poverty and improving household

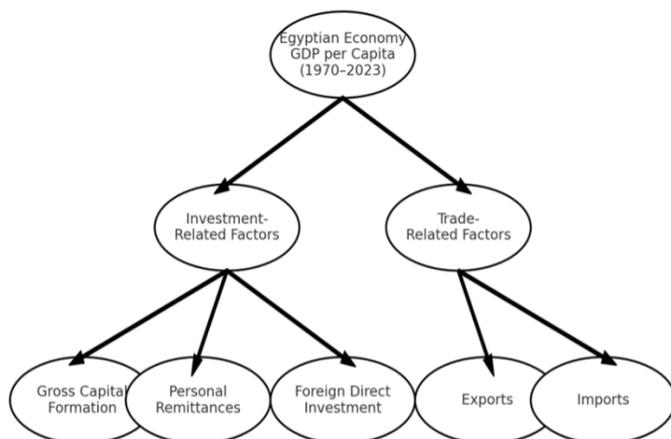
welfare by supplementing income and increasing access to education, healthcare, and basic services (Adams & Page, 2005).

Moreover, trade-related variables, such as exports and imports of goods and services, are widely recognized in the economic literature as key indicators of a country's openness and integration into the global economy. Dollar and Kraay (2004) emphasized that trade liberalization fostered economic growth, which in turn contributed to poverty reduction. Exports stimulate domestic production by enhancing competitiveness and generating foreign exchange earnings. Imports enable access to foreign technologies, capital goods, and knowledge that support productivity gains and industrial development. In this study, these trade and investment-related variables were examined within the framework of Modernization Theory to illustrate how trade openness, supported by institutional reforms, contributed to sustained GDP per capita growth in Egypt.

Figure 2

Researcher's Conceptual Framework Model

Figure 2 below illustrates the conceptual framework for this study. It depicts the relationship between GDP per capita (1977–2023) and its associated factors, categorized into investment-related factors and trade-related factors. The framework provides a clear visualization of the variables and their connections.



Purpose Statement

This study examined the relationship between gross capital formation, personal remittances, foreign direct investment, exports, imports, and GDP per capita in Egypt from 1970 to 2023, guided by the principles of Modernization Theory. However, due to inconsistencies in the data from 1970 to 1976, only the years 1977 to 2023 were included in the final analysis. The independent variables were defined as gross capital formation, personal remittances, foreign direct investment, exports, and imports, while the dependent variable was defined as GDP per capita.

Research Question

How do gross capital formation, personal remittances, foreign direct investment, exports, and imports predict GDP per capita in Egypt from 1977 to 2023?

Subproblems

1. What was the level of gross capital formation in Egypt from 1977 to 2023?
2. What were the levels of personal remittances in Egypt from 1977 to 2023?
3. What was the level of foreign direct investment in Egypt from 1977 to 2023?

4. What were the levels of exports in Egypt from 1977 to 2023?
5. What were the levels of imports in Egypt from 1977 to 2023?
6. What was the level of GDP per capita in Egypt from 1977 to 2023?
7. How did gross capital formation, personal remittances, foreign direct investments, exports, and imports collectively predict GDP per capita in Egypt from 1977 to 2023?

Hypothesis

H_0 : Gross capital formation, personal remittances, foreign direct investment, exports, and imports do not predict GDP per capita in Egypt from 1977 to 2023.

H_a : Gross capital formation, personal remittances, foreign direct investment, exports, and imports predict GDP per capita in Egypt from 1977 to 2023.

Definitions

Egypt

Egypt, officially the Arab Republic of Egypt, is a transcontinental country in northeastern Africa, with the Sinai Peninsula extending into Asia. It borders the Mediterranean Sea to the north, Israel and the Gaza Strip to the northeast, the Red Sea to the east, Sudan to the south, and Libya to the west (Central Intelligence Agency, n.d.).

Gross Capital Formation

Gross capital formation refers to the total value of acquisitions, less disposals, of produced assets intended for fixed capital formation, inventories, or valuables. It reflects the total investment in physical capital within a country's economy. In this study, gross capital formation is measured as a percentage of Egypt's Gross Domestic Product (GDP), based on data from the World Bank (n.d.-c).

Personal Remittances

Personal remittances comprise personal transfers and compensation of employees. Personal transfers include all current transfers in cash or in kind made or received by resident households to or from nonresident households, encompassing all current transfers between resident and nonresident individuals (World Bank, n.d.-d). In this study, personal remittances refer to the total remittances received by Egypt from 1977 to 2023 and are measured as a percentage of GDP, based on data from the World Bank.

Foreign Direct Investment (FDI)

Foreign direct investment refers to the net inflows of investment intended to acquire a lasting management interest—defined as 10 percent or more of voting stock—in an enterprise operating in an economy other than that of the investor. It includes the sum of equity capital, reinvested earnings, other long-term capital, and short-term capital, as recorded in a country's balance of payments (World Bank, n.d.-e). In this study, foreign direct investment is measured as a percentage of Egypt's GDP, based on data from the World Bank.

Exports of Goods and Services

Exports of goods and services represent the value of all goods and market services provided by residents to the rest of the world. These include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income, as well as transfer payments (World Bank, n.d.-f). In this study, exports are measured as a percentage of Egypt's GDP, based on data from the World Bank.

Imports of Goods and Services

Imports of goods and services comprise all transactions involving a change in economic ownership of goods and services from nonresidents to residents. This includes general merchandise, transportation, travel, financial services, and other service imports provided by the rest of the world to the domestic economy. In this study, imports are measured as a percentage of Egypt's GDP, based on data from the World Bank (n.d.-g).

GDP Per Capita

GDP per capita is calculated by dividing a country's gross domestic product by its midyear population. It reflects the average economic output per person and serves as a proxy for the standard of living. In this study, GDP per capita is measured in constant 2015 U.S. dollars to adjust for inflation and enable consistent comparisons over time. GDP represents the total value added by all resident producers within an economy, including product taxes and excluding subsidies not already incorporated in product valuation. This measure does not deduct for capital depreciation or resource depletion (World Bank, n.d.-h).

Delimitations

This study was confined to economic data from Egypt spanning 1977 to 2023, reflecting both data availability and the intent to capture multiple phases of regime change. The analysis was delimited to five independent variables: gross capital formation (% of GDP), personal remittances (% of GDP), foreign direct investment (% of GDP), exports of goods and services (% of GDP), and imports of goods and services (% of GDP), each selected for its documented influence on economic growth in the macroeconomic literature. Gross Domestic Product (GDP) per capita, measured in constant 2015 U.S. dollars, served as the dependent variable, allowing for a clear assessment of the standard of living for an Egyptian citizen throughout the study period. Data were sourced exclusively from the World Bank's World Development Indicators

database to standardize measurement approaches and enhance comparability, excluding additional sources or national-level datasets. Collectively, these delimitations were established to ensure a focused and methodologically consistent examination of the determinants of economic growth in Egypt.

Assumptions

It was assumed that the data from 1977 to 2023 consistently and accurately reflected Egypt's economic conditions during this period, although this assumption may not be universally accepted by all researchers. It is also assumed that the definitions and methodologies used to calculate these economic indicators remained consistent throughout the study period.

Significance of the Study

This study was significant because it sought to reconcile the often-contradictory findings regarding the impact of trade openness and investment-related factors on a developing nation's standard of living (Dorn et al., 2021). While influential works had long examined the relationship between modernization and economic growth (Frankel & Romer, 1999), the specific effects of trade policies and capital flows on long-term development trajectories remained contested, particularly in countries undergoing frequent policy shifts. In Egypt's case, a series of historical reforms—beginning with the Open Door Policy in the 1970s and extending through the Economic Reform and Structural Adjustment Program (ERSAP) in the 1990s—had produced mixed results. By analyzing the roles of exports, imports, foreign direct investment (FDI), remittances, and gross capital formation over an extended period (1970–2023), this study addressed a critical gap in the literature, offering a longitudinal perspective often absent from short-term or cross-sectional analyses.

Theoretically, this investigation built upon both classical growth models and modernization theory, which posit that physical and human capital accumulation, technological advancement, and trade openness were primary drivers of sustainable economic expansion (Rostow, 1960; Solow, 1956). By narrowing the analytical scope to Egypt and employing robust statistical techniques on an extended historical dataset, this study tested the extent to which these theoretical propositions held under the country's distinctive institutional, demographic, and policy conditions. This approach not only evaluated the relevance of existing theories but also provided an opportunity to refine them by uncovering novel interaction effects among investment, trade, and economic growth variables.

Practically, the research provided a basis for understanding how trade-related and investment-related variables jointly influenced GDP per capita, offering insights for policymakers, development practitioners, and international organizations seeking to reduce poverty and enhance economic performance in Egypt and comparable developing countries. Insights into these dynamics could inform the design of policies to improve capital inflows, reshape trade regulations, and allocate resources more efficiently.

In addition, the extended historical lens (1977–2023) represented a methodological contribution by enabling the study to capture the cumulative impact of several key policy periods in Egypt. Previous research often limited its scope to shorter timeframes, potentially overlooking the long-run effects of structural adjustments and external shocks that shaped capital flows and trade dynamics. In contrast, this study's longitudinal design examined both the immediate and sustained consequences of policy shifts, thereby enhancing the resilience of the findings to short-term economic fluctuations. This approach offered a potential model for future research utilizing similarly comprehensive datasets to analyze economic development in other emerging markets.

Chapter Two

Literature Review

Section 1: Modernization Theory: Foundations and Critiques

Modernization theory offers a conceptual framework for understanding how societies transition from traditional socioeconomic structures to modern industrial economies. Emerging in the mid-20th century, modernization theory conceptualizes development as a linear progression whereby societies evolve from agrarian-based structures to technologically advanced economies.

Lipset (1959) articulated one of the earliest and most influential formulations of modernization theory by proposing a positive relationship between economic development and democratic stability. Lipset (1959) identified average wealth, industrialization, urbanization, and education as central factors in fostering democratic societies. As a population becomes wealthier and more educated, Lipset (1959) argued, it tends to exhibit greater political moderation, tolerance, and participation, traits that reinforce democratic norms. According to Lipset (1959), these structural shifts support the rise of a stabilizing middle class that plays a critical role in sustaining democratic systems.

Rostow (1960) built upon Lipset's (1959) work by asserting that a society's transition toward modernization follows a linear model of economic development. He developed a five-stage framework that traces societal transformation from traditional economies to modern, industrialized nations. In the first stage, titled "traditional society," economic activity is rooted in subsistence agriculture with minimal scientific or technological input. The second stage, titled "preconditions for take-off," marks a transitional period defined by the emergence of modern

institutions, infrastructure investments, and rising productivity. The third stage is titled "take-off." It is characterized by a short phase of rapid industrial expansion, institutional consolidation, and increased investment, often surpassing 10% of national income. During the "drive to maturity," which is the fourth stage, economies diversify beyond early growth sectors, adopt advanced technologies, and achieve sustained growth alongside improved living standards. Finally, the fifth stage, titled "age of high mass consumption," reflects a shift toward service-sector dominance and consumer-driven demand. Rostow's (1960) model remains foundational to modernization theory, presenting development as a linear, sequential process.

Despite the enduring influence of modernization theory, Rostow's (1960) work has faced substantial critique for its oversimplified and deterministic view of development. Acemoglu and Robinson (2012) challenged the assumption that linear progression alone drives growth, emphasizing instead the decisive role of inclusive institutions that support innovation, accountability, and broad-based participation. In addition, Escobar (1995) further criticized the underlying assumptions of Rostow's (1960) framework by arguing that Eurocentrism is inherent in it, as it imposes a Western historical trajectory onto diverse societies while neglecting the structural and cultural conditions that shape development in the Global South.

Deutsch (1961) added depth to the modernization theory by focusing on social mobilization as a key mechanism linking socioeconomic transformation to political development. Rather than assuming modernization is uniformly stabilizing, he conceptualized it as a complex, potentially destabilizing process. As individuals shift occupations, improve their literacy, relocate, and increase their exposure to media and politics, expectations rise, often outpacing the ability of political institutions to adapt. Drawing on quantitative indicators and a hypothetical model, Deutsch (1961) demonstrated that mismatches between social change and

institutional capacity can result in elite dislocation, legitimacy crises, and political instability. Deutsch's (1961) work redefined modernization as a process marked by friction and uneven outcomes.

Delacroix and Ragin (1978) further examined the modernization narrative by analyzing the differential effects of modernizing institutions across developing countries. Their panel regression analysis incorporated economic variables and used proxies such as secondary school enrollment and cinema attendance (adjusted for U.S. film dominance) to capture institutional exposure. While education was positively associated with economic development, particularly in mobilizing regimes, mass media exposure to Western cultural products was negatively associated with economic development, undermining local values and economic outcomes. Their findings revealed that institutional influence was not uniformly beneficial and depended heavily on the broader structural and political context.

Tipps (1973) issued one of the most comprehensive conceptual critiques of modernization theory, challenging its empirical ambiguity and ideological assumptions. He argued that "modernization" had become an ambiguous umbrella term, conflating industrialization, democratization, and Westernization without analytical precision. This imprecision hindered systematic testing and cross-cultural comparison. Moreover, Tipps's (1973) work criticized the traditional-versus-modernity binary, asserting that it universalized Western experiences while ignoring colonial legacies and internal diversity within developing societies. His critique shifted the discourse toward more historically grounded, pluralistic frameworks for understanding development.

More recent empirical studies have reinforced these critiques by highlighting the importance of institutional quality in long-term development. Cherif and Dreger (2016)

examined 15 MENA countries from 1990 to 2007. They found that indicators of governance, particularly corruption control and legal enforcement, were far more predictive of financial development than conventional macroeconomic variables, such as income or inflation. Their findings directly challenged the assumption that economic liberalization automatically spurs growth and highlighted the indispensable role of institutions in shaping outcomes.

In a country-specific study, Khan and Miller (2016) examined Egypt's post-liberalization experience, offering a sobering critique of market reform without accompanying institutional reform. Although structural adjustment policies introduced in the 1990s initially spurred growth and foreign investment, they ultimately failed to address systemic problems, including crony capitalism, youth unemployment, and bureaucratic inefficiency. Following the 2011 revolution, successive regimes adopted short-term populist policies, including subsidies and wage increases, without implementing more comprehensive structural reforms. The result was continued macroeconomic instability, including rising deficits and capital flight. Khan and Miller (2016) argued that Egypt's development setbacks stemmed not from economic liberalization per se but from institutional fragility and inconsistent policy implementation. Their analysis aligns with broader institutional critiques of modernization theory, demonstrating that governance capacity, rather than mere economic openness, drives sustainable development.

Together, these foundational and critical contributions to modernization theory reveal a dynamic and evolving body of scholarship. While early theorists such as Lipset (1959) and Rostow (1960) presented linear, universalist models centered on economic growth and institutional transformation, later contributions, including those by Deutsch (1961) and Delacroix and Ragin (1978), demonstrated that modernization can generate divergent and destabilizing effects. Scholars such as Tipps (1973) and Przeworski (2004) challenged the theory's conceptual

clarity and highlighted the importance of institutional diversity and historical specificity. Recent regionally focused studies by Cherif and Dreger (2016) and Khan and Miller (2016) further support these critiques, demonstrating that institutional quality, rather than economic liberalization alone, determines development outcomes in the MENA region, including Egypt specifically. Collectively, these works highlight the limitations of traditional modernization theory while underscoring the need for nuanced, country-specific, and longitudinal research that integrates macroeconomic trends with governance dynamics. This dissertation addresses this need by critically reassessing modernization theory through an Egypt-focused analysis of trade and investment variables over the period 1970–2023.

Section 2: Gross Capital Formation

Gross capital formation (GCF) plays a central role in economic growth by facilitating investment in physical assets, infrastructure, and productive capacity. GCF comprises investments in fixed assets, such as machinery, buildings, and infrastructure, and is widely regarded as a prerequisite for structural transformation and modernization. Both theoretical and empirical research emphasize the criticality of capital accumulation in sustaining long-term growth. Levine and Renelt (1992) conducted an extensive series of cross-country regressions, identifying physical capital investment as one of the most robust predictors of growth. Within the context of modernization theory, investment in physical capital is viewed as a pivotal mechanism by which societies transition from agrarian economies to industrialized, high-productivity systems characterized by greater institutional complexity and technological advancement.

Özdemir (2023) examined the impact of human capital, proxied by returns to education and years of schooling, on gross capital formation (GCF) across 19 OECD countries from 1980 to 2017 using quantile regression techniques. The study found that human capital had a more

substantial positive effect on investment in countries and quantiles with lower levels of investment, suggesting that education-driven spillovers were especially impactful in economies in earlier stages of capital accumulation.

The classical Solow–Swan growth model provided foundational insights into the relationship between capital accumulation and economic output, demonstrating that increases in physical capital enhanced labor productivity. However, these gains diminish over time due to decreasing marginal returns to capital (Solow, 1956). Mankiw et al. (1992) extended the Solow model by incorporating human capital, demonstrating that differences in education and skill development significantly improved the model’s ability to explain cross-country income disparities. Once human capital was accounted for, variation in savings rates and population growth emerged as dominant explanatory factors. In particular, higher saving rates were associated with higher steady-state income, while high population growth had a more pronounced negative effect than originally captured in Solow’s (1956) formulation. This body of research suggested that capital accumulation needed to be analyzed within the demographic and educational context of each country.

Kose et al. (2009) emphasized that not all capital inflows produced the same productivity outcomes. Using macroeconomic data, they found that foreign direct investment (FDI) and portfolio equity flows were positively associated with total factor productivity (TFP) growth, while external debt inflows had a negative effect. This adverse impact, however, was significantly weaker in countries with well-developed financial markets and stronger institutions. Kose et al. (2009) argued that institutional and financial capacity shaped a country’s ability to convert external financial integration into long-term efficiency gains. Their findings supported a

more nuanced view of capital account liberalization, particularly in contexts with adequate domestic structures.

Topcu et al. (2020) examined the dynamic relationship between GCF, energy consumption, and natural resource rents across 124 countries from 1980 to 2018. Their findings revealed that the effect of capital formation on economic growth varied significantly by income level. In high-income countries, GCF positively contributed to growth alongside energy consumption and urbanization. However, in low-income countries, GCF had a negative impact on GDP, suggesting that without institutional support, absorptive capacity, and infrastructure, capital accumulation alone was insufficient to stimulate growth (Topcu et al., 2020). This study reinforced the importance of tailoring investment strategies to each country's structural and institutional conditions.

A key dimension in the literature was the distinction between domestic and foreign investment sources. While domestic GCF remained fundamental for self-sustaining growth, FDI served as a strategic complement by introducing financial resources, advanced technology, managerial expertise, and access to global markets. Borensztein et al. (1998) conducted one of the most influential empirical studies in this area, analyzing foreign direct investment (FDI) from industrialized to developing countries over a 20-year period. They found that FDI was more effective than domestic investment in driving productivity growth, primarily through technology transfer, provided the host country possessed sufficient human capital. In countries with low educational attainment, FDI yielded negligible or even adverse effects (Borensztein et al., 1998). Their findings highlighted that the benefits of FDI were conditional and required supportive domestic structures to be fully realized.

In a regionally focused study, Pasara and Garidzirai (2020) examined the causal relationship between GCF, unemployment, and GDP growth in South Africa from 1980 to 2018. Their findings confirmed a long-term positive association between GCF and GDP, affirming the role of capital formation in stimulating economic growth. Moreover, GCF also positively influenced unemployment, a result that Pasara and Garidzirai (2020) interpreted as a potential signal that investment alone did not automatically generate employment unless complemented by supportive fiscal policies.

Rodrik (2006) offered a robust critique of generalized reform strategies, arguing that economic growth policies needed to be tailored to a country's unique institutional, political, and structural landscape. Drawing from the World Bank's Learning from Reform report, Rodrik (2006) critiqued the limited success of standardized liberalization policies across developing regions and instead called for growth diagnostics that identified and targeted binding constraints. In the context of Egypt, where decades of capital accumulation had not translated into inclusive or sustained gains, this approach was particularly relevant. Rodrik (2006) emphasized that context-specific solutions often drove growth and that institutionalizing the diagnostic process was as important as implementing any single policy.

Empirical evidence from Egypt supported Rodrik's (2006) argument for context-specific growth strategies. Abdelgany (2020) documented a steady decline in Gross Fixed Capital Formation (GFCF) as a share of GDP over the past two decades, reflecting a parallel drop in the saving-to-GDP ratio. When compared to other MENA economies, Egypt's GFCF remained relatively low, highlighting the need to boost domestic savings and confront structural barriers to investment. These trends helped clarify why capital formation had not consistently translated into growth and reinforced the case for more targeted investment policy reforms. Similarly,

Dobronogov and Iqbal (2005) identified government consumption, private sector credit, and external conditions, such as OECD GDP, as key growth drivers since 1986, but pointed to financial intermediation inefficiencies as a major constraint limiting Egypt's capacity to convert capital into productive outcomes.

More recent studies by Abdulsahib (2024) and Abd El-Aal et al. (2025) highlighted the regional significance of GCF while also revealing persistent structural inefficiencies. Assessing causality, Abdulsahib (2024) found that GCF significantly influenced both exports and imports in Iraq; however, trade did not reciprocally affect capital formation. This unidirectional relationship reflected a pattern in which export earnings were primarily used for consumption rather than being reinvested in productive sectors. Abd El-Aal et al. (2025) examined trade determinants between Egypt and BRICS nations. They found that Egypt's gross fixed capital formation (GFCF) had a statistically significant negative effect on trade flows. Abd El-Aal et al. (2025) also emphasized that industrial value added and global demand, proxied by global GDP, played a larger and more consistent role across models. Abdulsahib (2024) and Abd El-Aal et al. (2025) emphasized the importance of strategic investment allocation and institutional reform in maximizing the developmental impact of GCF in the MENA region.

The role of remittances in capital formation also warrants attention. Amutabi (2023) assessed this relationship for the Kenyan economy from 1980 to 2020 and found that remittances had a negative impact on GFCF in the short run but no significant impact in the long run. These findings suggest that remittances are primarily used for consumption rather than investment and that their effectiveness as a development tool depends on the sophistication of the financial system and policy incentives. Given Egypt's similar reliance on remittance inflows, these

inefficiencies may likewise be present, reinforcing the need for policy frameworks that channel remittances into productive uses.

Despite widespread agreement on the importance of capital accumulation, scholars such as Pritchett (2000) and Acemoglu et al. (2001) cautioned that high investment levels did not guarantee sustained economic growth. Pritchett (2000) argued that many countries did not experience stable, linear growth because of policy failures, macroeconomic volatility, and institutional or structural weaknesses. These factors contributed to growth collapses or prolonged stagnation, preventing countries from realizing expected returns on reform or capital accumulation. Acemoglu et al. (2001) highlighted the role of institutions, arguing that in contexts governed by extractive political and economic systems, capital was frequently misallocated or captured by elites, thereby undermining its developmental impact.

In conclusion, gross capital formation remains a foundational component of economic development, enabling structural transformation, industrialization, and productivity gains (Levine & Renelt, 1992; Mankiw et al., 1992). However, its effectiveness depends on a country's institutional quality, absorptive capacity, and strategic investment allocation (Acemoglu et al., 2001; Pritchett, 2000; Rodrik, 2006). While studies such as Topcu et al. (2020) and Pasara and Garidzirai (2020) affirmed the positive relationship between GCF and GDP in well-governed or high-income environments, Egypt-specific analyses (Abdelgany, 2020; Dobronogov & Iqbal, 2005) revealed that structural inefficiencies and weak institutions often diminished the impact of investment. Recent MENA-focused studies (Abd El-Aal et al., 2025; Abdulsahib, 2024) further suggested that aligning capital investment with sectoral priorities and global economic trends was essential. These findings underscored that while GCF was indispensable, it had to be paired with human capital development, governance reform, and policy coherence to drive sustainable

economic growth. The next section examines personal remittances, another crucial source of external finance, to explore their developmental potential under similarly constrained institutional conditions.

Section 3: Personal Remittances

Personal remittances are a crucial source of external finance for many developing economies. Ratha (2013) highlighted the critical role of personal remittances in reducing poverty and improving household welfare. Ratha (2013) found that an approximately 10% increase in per capita remittances was associated with a 3.5% decline in poverty. Ratha (2013) also found that remittances were notably countercyclical, rising during periods of economic and political upheaval when other financial flows contracted. This dynamic was evident during the Arab Spring in Egypt, when remittance inflows increased as a form of crisis support. While remittances provided household-level resilience, their broader developmental impact depended heavily on the quality of institutions and the financial infrastructure. To maximize their potential, Ratha (2013) advocated for policy reforms that lowered transaction costs, expanded financial inclusion, and leveraged diaspora capital through mechanisms such as diaspora bonds.

Adams and Page (2005) also reported similar findings to those of Ratha (2013). They conducted a cross-country analysis of 71 low- and middle-income nations, showing that a 10% increase in official remittances per capita reduced the poverty headcount ratio by 3.5%, while a similar increase in the share of international migrants lowered poverty by 2.1 percentage points. Adams and Page (2005) defined remittances broadly to encompass both formal and informal transfers, underscoring their effectiveness as anti-poverty mechanisms, particularly in areas where state support was limited. These results affirmed that remittances often outperformed conventional income sources in improving household welfare.

Moving beyond household welfare, Giuliano and Ruiz-Arranz (2009) examined the macroeconomic implications of remittances for long-term economic growth. Their panel study of 100 developing countries found that remittances promoted growth in contexts with underdeveloped financial systems. In such environments, remittances served as a substitute for formal credit, eased liquidity constraints, and helped finance investments. However, this growth-enhancing effect diminished in countries with more advanced financial sectors, where remittances tended to be procyclical and less impactful on investment. Aggarwal et al. (2011) provided further nuance, demonstrating that remittances could promote financial development by increasing bank deposits and credit as a percentage of GDP, particularly in economies with limited access to finance. The studies by Giuliano and Ruiz-Arranz (2009) and Aggarwal et al. (2011) suggested that remittances could contribute to modernization and capital formation, especially when formal financial institutions were absent or inadequate.

Nevertheless, optimism regarding the developmental role of remittances was tempered by a set of Egypt-focused studies that revealed more complex and sometimes contradictory effects. Khodeir (2015) found that remittances to Egypt from 1980 to 2012 were procyclical rather than countercyclical, rising during periods of economic expansion. This pattern suggested that remittance flows were driven more by investment motives than altruism, challenging the notion of remittances as a reliable safety net during downturns. Similarly, Qutb (2021) reported a negative relationship between remittances and GDP per capita in Egypt, attributing this outcome to the predominantly consumption-oriented use of remittances, which increased imports and inflation rather than supporting productive domestic investment. These findings aligned with those of Chami et al. (2005), who argued both theoretically and empirically that remittances were primarily compensatory transfers with limited growth potential. Chami et al. (2005) identified a

moral hazard effect whereby recipients reduced labor supply or forewent investment in productivity in anticipation of continued financial support. The findings of Chami et al. (2005) indicated that remittances may have reinforced dependency rather than stimulated structural transformation in fragile economic settings.

Contrary to more skeptical perspectives, Alamoudi (2024) found a more optimistic interpretation of the relationship between remittances and economic growth based on an analysis of Egypt from 1996 to 2022. The study found that remittances had a significant positive impact on GDP growth in the long run, although their effect in the short run was limited. In addition, the developmental benefits of remittances were conditioned by governance quality. In contexts with stronger institutional frameworks, remittances were more likely to be directed toward productive investment, while in weaker governance settings, they were often used primarily for consumption. Alamoudi's (2024) findings thus offered a conditional affirmation of the growth-enhancing potential of remittances, contrasting with the purely compensatory role highlighted in Chami et al. (2005).

In contrast, Abdih et al. (2012) examined the feedback loop between remittances and institutional quality across 111 developing countries. Their study found that high remittance inflows were significantly associated with weaker governance indicators, including lower control of corruption, reduced government effectiveness, and diminished rule of law. Employing instrumental variables to address endogeneity, they argued that remittances reduced citizens' reliance on public services, thereby weakening accountability mechanisms and eroding incentives to demand institutional reform. These findings were particularly relevant for Egypt, where large-scale remittance inflows coexisted with persistent institutional fragility.

Akçay and Karasoy (2019) investigated the structural and macroeconomic drivers of remittance inflows to Egypt between 1980 and 2015. Their analysis highlighted the central role of external conditions, particularly oil price fluctuations, exchange rate depreciation, and economic performance in host countries, in shaping remittance patterns. Akçay and Karasoy (2019) found an inverse relationship between remittances and domestic financial development, implying that remittances often functioned as a substitute for formal credit systems when local financial institutions were weak or underdeveloped. In such environments, remittances were more likely to be directed toward short-term consumption rather than long-term investment, reinforcing their compensatory role in the absence of an inclusive financial infrastructure. These findings reflected the complex and context-dependent nature of remittances, which could act as both a buffer against external shocks and a signal of persistent structural deficiencies (Akçay & Karasoy, 2019).

The literature reviewed on remittances presented a complex and context-sensitive picture of their developmental effects. Early global studies (Adams & Page, 2005; Ratha, 2013) emphasized the poverty-reducing and stabilizing potential of these financial flows, while more recent Egypt-specific analyses revealed the importance of economic structure and institutional capacity in determining outcomes. Evidence from Khodeir (2015), Qutb (2021), and Chami et al. (2005) suggested that remittances may have been procyclical, consumption-driven, and potentially detrimental to growth in environments lacking effective governance. Conversely, studies by Giuliano and Ruiz-Arranz (2009), Aggarwal et al. (2011), and Alamoudi (2024) highlighted conditions under which remittances could have supported financial deepening, investment, and long-term growth. The diverging conclusions across this literature underscored that the developmental effectiveness of remittances was not determined solely by their volume or

origin, but by the broader macroeconomic and institutional landscape in which they were received. In the Egyptian context, where institutional weaknesses persisted, understanding and reforming the channels through which remittances operated remained critical. The following section turns to foreign direct investment (FDI) as another key external financial flow and its evolving role in Egypt's growth trajectory.

Section 4: Foreign Direct Investment

Foreign direct investment (FDI) maintains a critical role in economic development, particularly in emerging economies seeking deeper integration into the global economy. Beyond providing external capital, FDI introduces advanced technologies, managerial expertise, and access to international networks, all of which can contribute to productivity gains and long-term growth. In the Egyptian context, this relationship has been the focus of extensive empirical investigation, with findings that highlight both the promise and the limitations of FDI-led growth.

Seyoum et al. (2015) examined the causal relationship between foreign direct investment (FDI) and economic growth across 23 African countries from 1970 to 2011. For Egypt, Seyoum et al.'s (2015) study revealed a unidirectional causal relationship between foreign direct investment (FDI) and GDP growth, supporting the FDI-led growth hypothesis. The relationship remained robust when FDI was measured as a percentage of gross capital formation, underscoring the importance of a stable and supportive investment environment. Building on this finding, Alaa et al. (2021) conducted a time-series analysis of Egypt from 1980 to 2018. They found a statistically significant, positive long-run impact of FDI on real GDP per capita. Alaa et al.'s (2021) results also indicated a bidirectional relationship, suggesting that FDI not only stimulates economic growth but is also responsive to Egypt's economic trajectory.

Additional support for a mutually reinforcing relationship between FDI and economic growth appeared in Omri and Sassi-Tmar's (2015) study of Egypt, Tunisia, and Morocco. Their findings confirmed a two-way relationship between FDI and economic growth in Egypt. Notably, trade openness and infrastructure were positively associated with FDI inflows, while human capital exerted no statistically significant influence, an outcome that sets Egypt apart from its regional peers in this study. Taken together, these studies affirm the relevance of FDI as both a driver and a product of economic growth in Egypt, while also highlighting the importance of institutional and structural conditions in shaping its effectiveness.

Yet, not all empirical work pointed to a straightforward or universally positive role for FDI. Carkovic and Levine (2002) conducted a panel study of 72 countries from 1960 to 1995 and found no robust evidence that FDI independently contributed to long-term growth. Their findings challenged earlier macro-level studies, suggesting that methodological limitations or reverse causality may have explained previous positive results. Instead, they argued that domestic institutions and sound economic fundamentals were more critical for sustained growth than FDI alone. Similarly, Rodrik and Subramanian (2009) questioned the assumption that financial globalization, including FDI, uniformly promoted development in savings-constrained economies. They contended that capital inflows could, under certain conditions, appreciate the real exchange rate, undermine export competitiveness, and divert investment away from tradable sectors. Rather than viewing economic liberalization as a panacea, Rodrik and Subramanian (2009) advocated for a more context-sensitive approach that prioritized regulatory prudence.

From a distributional perspective, Rezk et al. (2022) used time series analysis to investigate FDI's impact on income inequality in Egypt between 1975 and 2017. Their findings revealed that FDI exerted a statistically significant negative effect on inequality, as measured by

the Gini coefficient. This outcome reinforced the view that foreign capital inflows could promote equity by improving access to capital and employment opportunities. These findings also bolstered the applicability of modernization theory to the Egyptian case, suggesting that FDI served as a conduit for broader development goals.

While early economic growth models such as Solow (1956) and Romer (1986) did not explicitly incorporate FDI, their frameworks offered conceptual insight. Solow's (1956) neoclassical growth model emphasized capital accumulation and technological progress, though it treated capital generically without distinguishing foreign from domestic sources. By contrast, Romer's (1986) endogenous growth model highlighted knowledge creation and spillovers, offering a theoretical rationale for how FDI might have fostered growth if it enhanced innovation and human capital. These foundational theories helped define the conditions under which FDI could become a catalyst for long-term economic development, specifically when domestic absorptive capacity and institutional quality were sufficient to translate inflows into productivity gains.

More nuanced insights emerged from regional and sectoral analyses. Hanafy and Marktanner (2019) examined sectoral FDI across 26 Egyptian governorates and found no unconditional effect of aggregate FDI on regional economic growth. Sector-specific findings were also mixed; agricultural FDI was negatively associated with growth, and service-sector FDI only produced positive effects when paired with sufficient domestic private investment (DPI), notably when DPI in services exceeded 4% of GDP. These findings underscore that the growth impact of FDI is not automatic but contingent on local investment capacity. Notably, the study cast doubt on human capital as the dominant absorptive channel, instead identifying DPI as the more reliable mechanism for converting FDI into sustained economic gains. A more recent study

by Omran and Bilan (2024), covering the period from 1976 to 2022, found that FDI inflows contributed positively to GDP and exports while reducing inflation, but paradoxically increased unemployment. These results underscored the complexity of FDI's short- and long-run impacts and the importance of labor market structure in shaping its developmental outcomes.

Raihan et al. (2025) further explored the synergistic role of FDI and renewable energy investment in Egypt from 1990 to 2021. Both FDI and renewable energy had statistically significant positive effects on GDP in both the short and long run. Their results demonstrated the potential for FDI to support sustainable development, particularly when directed toward energy and infrastructure sectors. Similarly, Petrović-Ranđelović et al. (2020) found a long-run bidirectional relationship between FDI and GDP in six emerging economies—Colombia, Indonesia, Vietnam, Egypt, Turkey, and South Africa (CIVETS)—indicating mutual reinforcement between investment flows and economic growth over time. However, they reported no long-run causal link between CO₂ emissions and either GDP or gross fixed capital formation, suggesting that environmental and output variables did not adjust to each other in the long term. In the short run, FDI responded to shifts in industrial activity and energy use, while CO₂ emissions had no significant influence on FDI, GDP, or GFCF. These findings underscored that while FDI could be a driver of growth, its environmental implications were highly context-dependent, and its short- and long-term effects varied across sectors and indicators.

De Mello (1999), in one of the earliest large-scale assessments of FDI's growth effects, found that while FDI could enhance capital accumulation and productivity, its success depended on complementary domestic investment and institutional quality. De Mello's (1999) results for non-OECD countries were more ambiguous, reinforcing the notion that FDI's benefits were not automatic and depended on internal economic conditions. This theme was also found in

Abouelfarag and Abed's (2019) sectoral analysis of FDI in Egypt, which found a weak but positive long-term effect on growth and employment. They observed favorable impacts in the financial and tourism sectors, but none in agriculture or manufacturing. Their findings reaffirmed the idea that FDI must align with sectoral priorities and institutional strengths to yield meaningful developmental outcomes.

Busse and Hefeker (2007) conducted a cross-country analysis spanning more than 20 years to examine the institutional and political determinants of foreign direct investment (FDI). In their initial models, only three indicators—government stability, religious tensions, and democratic accountability—showed a strong association with FDI inflows. However, using more robust dynamic panel methods, the study found that a broader set of factors significantly influenced investment decisions. These included government stability, internal and external conflicts, law and order, ethnic tensions, bureaucratic quality, and, to a lesser extent, corruption and democratic accountability. The findings suggested that political risk and institutional quality were critical considerations for multinational corporations deciding where to invest in developing countries. Interestingly, Helmy (2013) found that in weak institutional environments like Egypt's, corruption may paradoxically attract FDI by allowing investors to circumvent regulatory bottlenecks. While counterintuitive, this finding highlighted the transactional nature of FDI in fragile governance contexts. Helmy (2013) suggested that legal and regulatory reform may be more effective than aggressive anticorruption campaigns in sustaining investor confidence.

The literature reviewed on foreign direct investment (FDI) in Egypt revealed a pattern of cautiously optimistic findings moderated by substantial context-dependence. While several studies confirmed a positive long-run relationship between FDI and GDP per capita (Alaa et al.,

2021; Omri & Sassi-Tmar, 2015; Seyoum et al., 2015), the strength and direction of this relationship were often a function of broader macroeconomic conditions, institutional capacity, and sectoral alignment. Foundational economic theories such as those advanced by Solow (1956) and Romer (1986) underscore the need for absorptive capacity and innovation-friendly environments to maximize the benefits of foreign capital. Sector-specific studies further qualified the growth effects of FDI, with evidence highlighting productive gains in finance and tourism (Abouelfarag & Abed, 2019) but weak or even negative impacts in agriculture and manufacturing (Hanafy & Marktanner, 2019). Moreover, findings from Rezk et al. (2022) and Raihan et al. (2025) suggested that under the right conditions, FDI could also advance equity and environmental goals. However, short-run effects such as rising unemployment (Omran & Bilan, 2024) and mixed environmental outcomes (Petrović-Ranđelović et al., 2020) highlighted the limits of its developmental reach.

Section 5: Trade Openness, Exports, and Imports

The idea that trade can drive economic growth in developing countries is grounded in Ricardo's principle of comparative advantage. According to this theory, international trade allows nations to specialize in the production of goods where they hold a relative efficiency advantage, ultimately improving productivity and overall welfare (Bernhofen & Brown, 2018).

Although Ricardo's original model focused on labor cost differences, contemporary studies extended this logic by measuring trade openness and performance using macroeconomic indicators such as exports and imports as a percentage of GDP. A nation's trade strategy emerged as a critical marker of its integration into the global economy. This relationship remained a cornerstone of development economics, especially in countries such as Egypt, which experienced alternating periods of liberalization and state intervention since the 1970s.

Frankel and Romer (1999) provided foundational evidence of the positive causal impact of trade on income using an instrumental variable approach based on exogenous geographic characteristics. Their analysis showed that higher trade shares were significantly associated with higher per capita income. Specifically, Frankel and Romer (1999) found that a 1-percentage-point increase in trade was linked to a 0.5% to 2% rise in income levels. Although their study did not focus on Egypt, the methodology was highly relevant given Egypt's strategic geographic location and its post-1990s trade liberalization efforts, including accession to the World Trade Organization and entry into regional trade agreements. Frankel and Romer's distinction between geography-induced and policy-induced trade openness offered an important lens for evaluating the effectiveness of Egypt's trade-driven growth strategies.

Grossman and Helpman (1991) presented a compelling case that international trade served as a vital mechanism for transmitting scientific and technological knowledge, especially in small, open economies. Within their endogenous growth model, knowledge spillovers from trade were shown to reinforce domestic innovation, partially offsetting persistent underinvestment in R&D caused by innovation-related externalities. They argued that protectionist policies further weakened innovation incentives and hindered growth, while trade liberalization helped correct these distortions by broadening access to global knowledge flows. Departing from earlier models that treated international spillovers as automatic, their work highlighted the importance of commercial exchange in facilitating the transfer of ideas across borders. These mechanisms had particular relevance for Egypt, where trade reforms in the 1990s and early 2000s were designed to support structural transformation and productivity gains.

Early empirical evidence also supported the export-led growth hypothesis. Balassa (1978) analyzed eleven semi-industrialized countries between 1960 and 1973 and found a strong

positive relationship between export expansion and economic growth. His findings suggested that countries pursuing export-oriented development, especially those prioritizing manufacturing exports, attained faster growth than those following inward-looking strategies. Balassa's (1978) results provided early empirical support for the view that integration into global markets served as a driver of structural transformation and productivity gains.

Additional global studies reinforced the relationship between trade openness and economic growth. Dollar and Kraay (2004) identified a group of "post-1980 globalisers," including China, India, and Vietnam, that implemented substantial tariff reductions and experienced significant increases in trade volumes. These countries saw marked improvements in per capita GDP growth following liberalization. In addition, Dollar and Kraay (2004) found no systematic relationship between trade openness and income inequality, suggesting that trade-led growth could be both equitable and inclusive. Egypt was listed among the globalizing countries in their analysis; however, its growth performance in the 1990s did not mirror the acceleration observed in most other globalizers. This divergence implied that the gains from trade liberalization were conditional on complementary domestic reforms, such as macroeconomic stability and institutional governance. These factors were particularly relevant when evaluating Egypt's trade-led development trajectory. These results aligned closely with Egypt's liberalization efforts since the 1990s and offered a strong rationale for treating exports and imports as core variables in understanding GDP growth. Lederman and Maloney (2003) added that it was not trade volume alone, but trade composition that mattered. They found that export concentration negatively affected growth, while more diversified and intra-industry trade patterns were linked to stronger economic performance. This insight was especially relevant for Egypt, where a narrow export base continued to limit the long-term benefits of trade openness.

Egypt-specific studies added further nuance. Hatab et al. (2010) found that GDP growth enhanced agricultural export performance, while higher GDP per capita reduced exports, likely due to rising domestic demand. Egypt's key agricultural exports included cotton, citrus, rice, and onions. Other findings indicated that factors such as geographic proximity, shared language, and currency depreciation improved export flows. In contrast, regional trade agreements such as the Common Market for Eastern and Southern Africa (COMESA) and the Greater Arab Free Trade Area (GAFTA) had a limited impact on agricultural exports. These results highlighted the importance of macroeconomic conditions and trade structure in shaping Egypt's export performance. In addition, Soliman (2024) found that most Egyptian imports, particularly essential goods like cereals and production inputs such as electrical machinery, nuclear reactors, boilers, and iron and steel, were price inelastic, indicating that currency devaluation did not significantly improve the trade balance. Only a few export sectors showed meaningful responsiveness to exchange rate changes. Soliman (2024) concluded that currency policy alone was insufficient to enhance trade performance and stressed the importance of complementary structural and industrial reforms.

Edwards (1993) comprehensively reviewed trade liberalization literature and concluded that outward-oriented economies generally outperformed protectionist ones, particularly when trade reforms were embedded within broader economic development strategies. Edwards (1993) highlighted evidence from Jung and Marshall (1985), who found a unidirectional causal relationship between export growth and GDP growth in a few countries, including Egypt. This finding supported the potential benefits of trade openness but also underscored the importance of context. Kim (2011), using instrumental variable threshold regressions, found that while trade liberalization was beneficial in developed economies, it could have negative consequences in

developing countries. Kim's (2011) findings were particularly relevant for Egypt, where weak financial institutions, high inflation, and low absorptive capacity may have led to specialization in low-productivity sectors, thereby limiting the benefits of trade openness. This perspective tempered overly optimistic assumptions regarding trade openness and economic growth and highlighted the need for contextual reforms.

Other sector-specific studies further illustrated the conditional nature of trade outcomes. Ahmed (2023) analyzed Egypt's poultry meat industry using a Strengths, Weaknesses, Opportunities, and Threats (SWOT) framework. He found that while the country had re-entered export markets after years of dormancy, the sector continued to suffer from weak processing, feed inefficiencies, and inconsistent compliance with international standards. The findings of Ahmed (2023) reinforced a recurring theme in the literature, emphasizing that trade openness must be accompanied by improvements in production quality, infrastructure development, and regulatory frameworks to yield lasting developmental benefits. Aneja and Arun (2021) added another dimension by finding a statistically significant long-run relationship between Net Barter Terms of Trade (NBTT) and GDP growth in Egypt. Their findings supported the Prebisch–Singer Hypothesis by demonstrating that favorable trade terms, such as rising export prices relative to import prices, were associated with higher national income in Egypt.

However, not all evidence supported a trade-led growth narrative. Bakari (2017) found that, between 1965 and 2015, exports and domestic investment exerted a negative long-run impact on Egypt's economic growth, while only imports contributed positively in the short run. These findings diverged sharply from conventional development theory and suggested that inefficiencies in Egypt's investment and export strategies undermined their growth potential. Poor linkages between domestic industries and global markets, along with an emphasis on low-

value-added production, may have helped explain this paradox. In addition, Hausmann et al. (2006) found that the contents of a nation's exports were critical for its long-term growth. Their analysis showed that countries that exported more advanced and high-productivity goods tended to grow faster than their counterparts even when controlling for income, education, and institutions. This suggested that developing countries could benefit by shifting toward more sophisticated exports, which helped build skills and expand learning. For Egypt, the study highlighted the importance of diversifying beyond traditional, low-value exports to support more substantial and sustained economic growth. Aly and Zaki (2025) found that while deep trade agreements were positively associated with Egypt's participation in global value chains (GVCs), institutional weaknesses, such as gaps in intellectual property rights and the absence of anticorruption provisions, limited the potential benefits. Their sectoral analysis showed that Egypt's GVC integration remained concentrated in low-value-added areas such as raw materials and fuel, rather than advancing into technology- or human-capital-intensive sectors, highlighting the need for complementary institutional reforms and export diversification strategies.

Finally, Farzanegan et al. (2019) provided a comprehensive analysis of Egypt's economic liberalization, demonstrating that increased trade and investment openness significantly reduced the size of the shadow economy as a share of GDP between 1976 and 2013. By incentivizing the movement of labor and capital from informal to formal sectors, liberalization contributed to productivity gains across the economy. Farzanegan et al. (2019) also highlighted the link between the shadow economy and political instability, emphasizing that tax revenue losses from informal activity could undermine state capacity. These findings underscored the developmental potential of trade openness, particularly when pursued alongside stable macroeconomic policies and robust institutional frameworks.

The literature reviewed on trade openness, exports, and imports revealed a nuanced and evolving understanding of their role in fostering economic growth in Egypt. Ricardo's classical trade theory (Bernhofen & Brown, 2018) and early empirical work (Balassa, 1978; Dollar & Kraay, 2004; Frankel & Romer, 1999) provided strong justification for liberalization strategies by linking openness to productivity gains, income growth, and poverty reduction. In the Egyptian context, these frameworks offered a compelling rationale for reforms initiated in the 1990s. However, a growing body of Egypt-specific scholarship highlighted that the benefits of trade openness were highly contingent on macroeconomic stability, sectoral structure, and institutional quality. Studies such as Hatab et al. (2010), Soliman (2024), and Ahmed (2023) emphasized that structural weaknesses, ranging from export concentration to the inelastic nature of imports, continued to limit the effectiveness of trade as a growth engine. Furthermore, empirical evidence from Kim (2011) and Bakari (2017) urged caution in assuming automatic gains from openness, particularly when financial infrastructure and industrial policy remained underdeveloped.

A consistent theme across the literature was that trade openness alone was insufficient to drive sustainable and inclusive economic growth. While favorable terms of trade (Aneja & Arun, 2021), deeper global value chain integration (Aly & Zaki, 2025), and a reduction in transactions in the informal economy (Farzanegan et al., 2019) offered encouraging signs, these gains were conditional on complementary reforms in institutional governance, investment targeting, and export upgrading. The Egyptian case exemplified how market liberalization had to be strategically aligned with domestic capacity-building to achieve long-term development outcomes; as such, future policies needed to move beyond generalized liberalization toward more focused strategies that prioritized diversification, innovation, and institutional resilience.

Section 6: Conclusion

This literature review examined the theoretical and empirical foundations underlying Egypt's economic development, focusing on five key macroeconomic predictor variables: gross capital formation, personal remittances, foreign direct investment, exports, and imports, within the framework of modernization theory. Fundamentally, modernization theory advances the idea that economic growth is both a catalyst and consequence of social transformation, institutional development, and political modernization (Lipset, 1959; Rostow, 1960). While early theorists emphasized linear progress through capital accumulation and industrialization, later scholars questioned the uniformity of such transitions, pointed to the critical roles of institutional state capacity, inequality, and global integration in shaping divergent developmental outcomes (Deutsch, 1961; Przeworski, 2004).

Empirical research on gross capital formation underscored both its centrality and complexity in driving economic growth. Cross-country analyses confirmed that investment in physical capital remained one of the most robust predictors of long-term income growth (Levine & Renelt, 1992). However, Egypt-specific studies indicated that the composition and allocation of investment mattered as much as its volume. Much of Egypt's capital formation had historically been directed toward politically motivated projects, with limited employment elasticity and low productivity spillovers, ultimately weakening its positive impact on GDP per capita (Abdelgany, 2020). These findings suggested that investment-led growth strategies in Egypt required institutional oversight and strategic targeting to maximize developmental outcomes.

The literature on personal remittances presented mixed findings. Globally, remittances were recognized for their role in alleviating poverty, smoothing consumption, and improving

household-level outcomes (Adams & Page, 2005; Ratha, 2013). In Egypt, while remittances accounted for a substantial share of GDP, their macroeconomic contribution remained contested. Several studies underscored their limited impact on long-term growth, citing consumption-driven use, inflationary pressures, and labor disincentives (Chami et al., 2005; Khodeir, 2015; Qutb, 2021). Others emphasized the structural and institutional conditions that mediated remittance effectiveness, including financial development, exchange rate policy, and diaspora engagement strategies (Akçay & Karasoy, 2019; Alamoudi, 2024). Additional research highlighted governance concerns, noting that large remittance inflows may have weakened citizens' demand for institutional reform (Abdih et al., 2012). These insights revealed that while remittances remained a vital income source, they were not a substitute for coherent investment policy, financial infrastructure, or governance reform.

Egypt's policy efforts to attract FDI through privatization and market liberalization produced mixed results. On the one hand, studies showed that FDI could positively impact GDP when embedded in a stable, institutionally supportive environment (Alaa et al., 2021; Seyoum et al., 2015). However, the benefits of FDI remained uneven across sectors, with limited developmental spillovers in agriculture and manufacturing, and weak absorption without sufficient domestic private investment (Abouelfarag & Abed, 2019; Hanafy & Marktanner, 2019). Additional research highlighted that FDI's effectiveness in Egypt depended not only on capital inflows but also on institutional quality, labor market structures, and alignment with national development priorities (Busse & Hefeker, 2007; Omran & Bilan, 2024). Ultimately, while FDI could contribute to long-term growth, its outcomes were highly context-dependent.

Finally, the extensive body of literature on trade openness, exports, and imports affirmed their importance to Egypt's long-run development, though the impact was conditional and often

asymmetric. Theoretical models suggested that openness enabled specialization, innovation, and scale economies (Frankel & Romer, 1999; Grossman & Helpman, 1991). Empirical evidence confirmed that exports, particularly in diversified or technologically sophisticated sectors, were positively associated with growth (Balassa, 1978; Lederman & Maloney, 2003). However, for Egypt, studies highlighted key limitations: export concentration, inelastic import demand, and limited integration into high-value global supply chains (Ahmed, 2023; Bakari, 2017; Hausmann et al., 2006; Soliman, 2024). Egypt's trade liberalization efforts had not uniformly translated into income gains, especially in the absence of institutional support and sectoral upgrading (Hatab et al., 2010; Kim, 2011). More promising were studies that highlighted the potential of deep trade agreements and stronger institutional quality to enhance Egypt's participation in global value chains and reduce informality, though these benefits remained conditional (Aly & Zaki, 2025; Aneja & Arun, 2021; Farzanegan et al., 2019).

The synthesis of theoretical and empirical literature yielded several critical insights relevant to Egypt's development strategy:

1. Institutional capacity shaped economic outcomes – Across all variables, the literature emphasized that institutions determined whether trade, investment, and financial flows translated into growth. Without robust governance, economic liberalization reinforced structural inefficiencies (Aly & Zaki, 2025; Kim, 2011).
2. Allocation of resources outweighed volume – Whether in capital formation, remittances, or FDI, growth depended less on quantity and more on targeted, efficient deployment toward productive sectors (Abdelgany, 2020; Akçay & Karasoy, 2019).
3. Trade openness was beneficial but conditional – While theoretically sound, Egypt's experience showed that trade liberalization yielded mixed results unless supported by

export diversification, sectoral readiness, and price elasticity (Bakari, 2017; Hausmann et al., 2006; Soliman, 2024).

4. Remittances and FDI required absorptive capacity – Foreign inflows only supported growth when domestic systems could productively absorb them; otherwise, they risked fueling consumption or crowding out local investment (Amutabi, 2023; Seyoum et al., 2015).

Taken together, this literature review revealed a critical pattern: while each of the five economic predictive variables examined—gross capital formation, remittances, FDI, exports, and imports—offered potential pathways to GDP per capita growth, their effectiveness in Egypt was contingent upon broader structural reforms, institutional modernization, and targeted policy alignment. Modernization theory provided a practical starting point but required complementary, context-specific analysis that accounted for sectoral dynamics, governance capacity, and external shocks. Egypt’s economic development trajectory depended not merely on increasing openness or investment volumes but on reconfiguring its political economy to ensure that these flows were equitably distributed, efficiently managed, and strategically deployed.

Chapter Three

Methodology

Research Design

The purpose of this study was to analyze economic relationships over time using a longitudinal, quantitative, non-experimental research design, which provided a standardized framework for statistically evaluating trends and associations (Creswell & Creswell, 2018). A descriptive design was deemed appropriate as it enabled the examination of historical macroeconomic data without manipulating variables, thereby facilitating the identification of trends and patterns over time (Siedlecki, 2020). The study relied exclusively on secondary data obtained from the World Bank's World Development Indicators (WDI) database, covering the years 1977 to 2023. This chapter outlined the research design, sample selection criteria, instrumentation, procedures, and data analysis methods. The independent variables were gross capital formation, personal remittances, foreign direct investment, exports, and imports, while the dependent variable was GDP per capita.

Sample

The population for this study was composed of annual economic data from Egypt spanning the period 1977 to 2023. Data were obtained from the World Bank's WDI database, a globally recognized source for standardized macroeconomic indicators. Since this study employed a longitudinal approach, the dataset included all available years, ensuring a comprehensive analysis of Egypt's economic trends and minimizing sampling bias.

Inclusion Criteria

1. Country-specific data were limited to Egypt
2. Annual observations covered the 1977–2023 timeframe

3. Complete entries were required for the dependent variable (GDP per capita, measured in constant 2015 U.S. dollars) and the five independent variables (gross capital formation, personal remittances, foreign direct investment, exports, and imports—each measured as a percentage of GDP)

Exclusion Criteria

1. Observations with missing values were removed
2. Non-country-specific data (e.g., regional or global aggregates) were omitted

Instrumentation

This study utilized secondary data from the World Bank's World Development Indicators (WDI) database, an annually updated and internationally recognized source of standardized economic indicators compiled from national statistical agencies, central banks, and international organizations. To ensure validity and reliability, the WDI dataset undergoes rigorous standardization and cross-verification with the International Monetary Fund (IMF), United Nations, and national government sources. Its consistent annual compilation enhances the reliability of year-over-year comparisons, thereby strengthening the longitudinal analysis of Egypt's economic performance. The dataset was retrieved directly from the World Bank's DataBank portal, ensuring authenticity, consistency, and methodological transparency (World Bank, n.d.-i).

The six economic indicators analyzed in this study were reported at the country level. The dependent variable, Gross Domestic Product per capita (GDP_PC), was measured in constant 2015 U.S. dollars and allowed for inflation-adjusted comparisons over time. The five independent variables included Gross Capital Formation (GCF), Personal Remittances Received (REMIT), Foreign Direct Investment (FDI), Exports of Goods and Services (EXPORTS), and

Imports of Goods and Services (IMPORTS). Each of these independent variables was expressed as a percentage of GDP, consistent with standard practice in macroeconomic research to account for scale and ensure comparability across time. These variables were selected based on their theoretical and empirical relevance to long-term economic growth, as summarized in Appendix A.

Table 1

Variable Name	Description	Data Type	Coding	Variable type in SPSS
GDP_PC	GDP per capita (Constant 2015 US\$)	Continuous	Actual Monetary value	Scale
Remit	Personal remittances, received (% of GDP)	Continuous	Percentage of GDP	Scale
FDI	Foreign direct investment, net inflows (% of GDP)	Continuous	Percentage of GDP	Scale
GCF	Gross capital formation (% of GDP)	Continuous	Percentage of GDP	Scale

Imports	Imports of goods and services (% of GDP)	Continuous	Percentage of GDP	Scale
Exports	Exports of goods and services (% of GDP)	Continuous	Percentage of GDP	Scale

Detailed descriptions of each variable are provided (see Appendix B).

Data interpretation followed standard economic principles. Higher values of GDP per capita were interpreted as indicators of a higher standard of living, while elevated levels of gross capital formation, personal remittances, foreign direct investment, exports, and imports were associated with increased economic activity and greater integration into global markets. Negative values for FDI or remittances signified capital outflows rather than inflows, which may have reflected underlying economic imbalances (Dasgupta, 2015; Kaminitz, 2023; Mawutor et al., 2023).

Procedure

The researcher requested and received an exempt review from the Exempt Review Committee of the Institutional Review Board at Marywood University. This exemption was granted because the study relied exclusively on secondary statistical data from the World Bank and did not involve human participants, medical testing, protected populations, or animal research. The IRB approval letter is included in Appendix C.

The dataset was obtained directly from the World Bank's World Development Indicators (WDI) database and was filtered to include annual data for Egypt from 1977 to 2023. From this

dataset, six relevant economic indicators were selected for analysis: GDP per capita (constant 2015 U.S. dollars), gross capital formation, personal remittances, foreign direct investment (FDI), exports, and imports. In this study, GDP per capita served as the dependent variable, while the remaining five indicators, each measured as a percentage of GDP, served as the independent variables. Once retrieved, the dataset was imported into SPSS Version 30 for cleaning and analysis.

To maintain data integrity and ethical standards, the dataset was stored on a password-protected computer accessible only to the principal researcher. All files were backed up using encrypted digital storage and were secured to prevent unauthorized access. The dataset consisted of publicly available macroeconomic indicators; no personally identifiable or confidential information was included.

Data Screening:

Missing data were handled using listwise deletion, whereby any observation containing missing values was removed. This approach resulted in the exclusion of personal remittances data from 1970 to 1976.

Outlier detection involved both univariate and multivariate techniques. Univariate outliers were identified using boxplots and standardized z-scores, with the conventional ± 3.29 standard deviation threshold applied (Tabachnick & Fidell, 2013, p. 73). Multivariate outliers were detected using Mahalanobis distance; cases exceeding the chi-square critical value of 20.515 ($df = 5, p < .001$) were considered for removal. An alpha level of .001 was used to ensure that only extreme outliers were identified.

The normality of residuals was assessed utilizing both statistical tests (Shapiro–Wilk) and visual inspection (Q–Q plots), applied to standardized, unstandardized, and studentized residuals.

Linearity and homoskedasticity were examined by using a scatterplot of standardized residuals versus standardized predicted values. A random distribution of points around the horizontal axis indicated a linear relationship between the independent and dependent variables. Similarly, a relatively constant spread of residuals across the predicted values suggested that the assumption of homoskedasticity (equal variance) was satisfied.

Multicollinearity was assessed using the Variance Inflation Factor (VIF), with values exceeding 10 flagged for further examination among the independent variables. Independence of errors was evaluated using both the Durbin–Watson statistic and the Breusch–Godfrey test to assess autocorrelation.

Analysis of Data

IBM SPSS Version 30 and StataNow Basic Edition 19.5 were used to analyze the data that were collected and cleaned by the researcher to address the research questions. Appropriate data screening, outlier detection, missing data handling, and assumption testing were conducted to ensure the validity of the results. An alpha level of .05 was used to determine statistical significance, corresponding to a 95% confidence interval for all statistical tests.

Subproblem One. What was the level of gross capital formation in Egypt from 1977 to 2023? This was analyzed using descriptive and inferential statistics, including measures of central tendency (e.g., mean, standard deviation, and range) and simple linear regression.

Subproblem Two. What were the levels of personal remittances in Egypt from 1977 to 2023? This was analyzed using descriptive and inferential statistics, including measures of central tendency and simple linear regression.

Subproblem Three. What was the level of foreign direct investment in Egypt from 1977 to 2023? This was analyzed using descriptive and inferential statistics, including measures of central tendency and simple linear regression.

Subproblem Four. What were the levels of exports in Egypt from 1977 to 2023? This was analyzed using descriptive and inferential statistics, including measures of central tendency and simple linear regression.

Subproblem Five. What were the levels of imports in Egypt from 1977 to 2023? This was analyzed using descriptive and inferential statistics, including measures of central tendency and simple linear regression.

Subproblem Six. What was the level of GDP per capita in Egypt from 1977 to 2023? This was examined using descriptive statistics only (e.g., mean, standard deviation, and range).

Subproblem Seven. How did gross capital formation, personal remittances, foreign direct investment, exports, and imports collectively predict GDP per capita in Egypt from 1977 to 2023? This was analyzed using multiple linear regression, with GDP per capita as the dependent variable and the five macroeconomic indicators as independent variables.

Regression Model Interpretation

A multiple linear regression analysis was conducted to assess the predictive ability of the five independent variables—gross capital formation, personal remittances, foreign direct investment, exports, and imports—on GDP per capita. The regression results included the following key metrics:

R² and Adjusted R²: These values indicated the proportion of variance in GDP per capita that was explained by the independent variables, serving as measures of the model's overall explanatory power.

F-statistic: This test assessed the overall statistical significance of the regression model and determined whether the set of independent variables collectively predicted GDP per capita.

Regression coefficients and p-values: The coefficients reflected the strength and direction of each predictor's effect on GDP per capita, while p-values indicated whether these effects were statistically significant.

Final Regression Equation: A predictive equation was generated using the estimated coefficients to model GDP per capita as a function of the five macroeconomic indicators.

Validity and Reliability of Data

To ensure the validity and reliability of the study, the dataset was sourced exclusively from the World Bank's World Development Indicators (WDI) database, a reputable and widely used source in peer-reviewed economic research (Nawaz et al., 2024; Pabreja, 2018; Ram & Ural, 2014). The use of standardized and consistently reported economic indicators enhanced the accuracy and comparability of the dataset across the 47-year study period.

Following data collection, the validity of the results was evaluated by testing key statistical assumptions for multiple linear regression, including linearity, normality, homoskedasticity, and independence of errors. Methodological limitations and potential sources of bias were transparently acknowledged and reported.

By implementing these methodological procedures, the study ensured that credible, replicable, and statistically robust conclusions were drawn about the relationship between GDP per capita and key economic indicators in Egypt from 1977 to 2023.

Chapter Four

Results

Introduction

This chapter presented the results of the statistical analyses conducted to address the research questions introduced in Chapter One. Drawing on annual macroeconomic data from Egypt (1977–2023) obtained from the World Bank, the study examined how five independent variables, gross capital formation, personal remittances, foreign direct investment, exports, and imports (each expressed as a percentage of GDP), explained variation in GDP per capita, measured in constant 2015 U.S. dollars. The analysis proceeded by addressing Subproblems 1 through 5, which involved separate simple linear regressions for each independent variable. Subproblem 6 reported descriptive statistics for GDP per capita across the study period, while Subproblem 7 assessed the combined explanatory strength of all five independent variables using multiple linear regression.

Although the original intent was to analyze the full period from 1970 to 2023, as stated in the Purpose Statement of Chapter One, missing data for personal remittances between 1970 and 1976 posed a methodological challenge. These missing values accounted for approximately 13% of the total dataset. Mean imputation was initially attempted to address the gap; however, this approach substantially weakened the regression model's explanatory power. A preliminary model using the full 1970–2023 dataset with mean-imputed remittance values yielded an adjusted R^2 of only .32. As a result, those incomplete cases were removed using listwise deletion.

Other alternatives, such as linear interpolation, were also considered. However, interpolation risked introducing artificial trends during a period likely marked by macroeconomic volatility. Because personal remittances served as a central independent variable

in the study, excluding years with missing data was deemed the most methodologically sound decision to preserve internal consistency and analytical reliability. The final dataset, therefore, comprised 47 annual observations spanning the years 1977 to 2023, a period for which complete data were available for all study variables.

Assumption Testing and Data Integrity Procedures

Before conducting the multiple linear regression analysis, a series of diagnostic tests was performed to ensure the validity, reliability, and rigor of the results. These procedures included detecting both univariate and multivariate outliers, assessing the normality of key variables, evaluating linearity and homoskedasticity, checking for multicollinearity among predictors, and testing for autocorrelation to confirm the independence of errors. These assumption checks ensured that the dataset met the core requirements of multiple regression analysis and helped safeguard against biased or misleading findings.

Outliers

Outliers had the potential to distort regression coefficients and inflate standard errors, thereby undermining the interpretability of results. Accordingly, both univariate and multivariate outliers were screened. Boxplots and standardized Z-scores were examined for univariate outlier detection. The threshold of ± 3.29 standard deviations from the mean was used to flag extreme values. While a few variables displayed individual points that appeared visually distant from the median in boxplots, only one case—foreign direct investment (FDI) in 2006—exceeded this threshold for a univariate outlier. Specifically, the 2006 FDI value of 9.35% produced a standardized Z-score of 3.45, surpassing the ± 3.29 criterion. However, this observation reflected a documented surge in foreign investment resulting from Egypt's mid-2000s structural reforms and was retained in the dataset to preserve historical accuracy and analytical continuity.

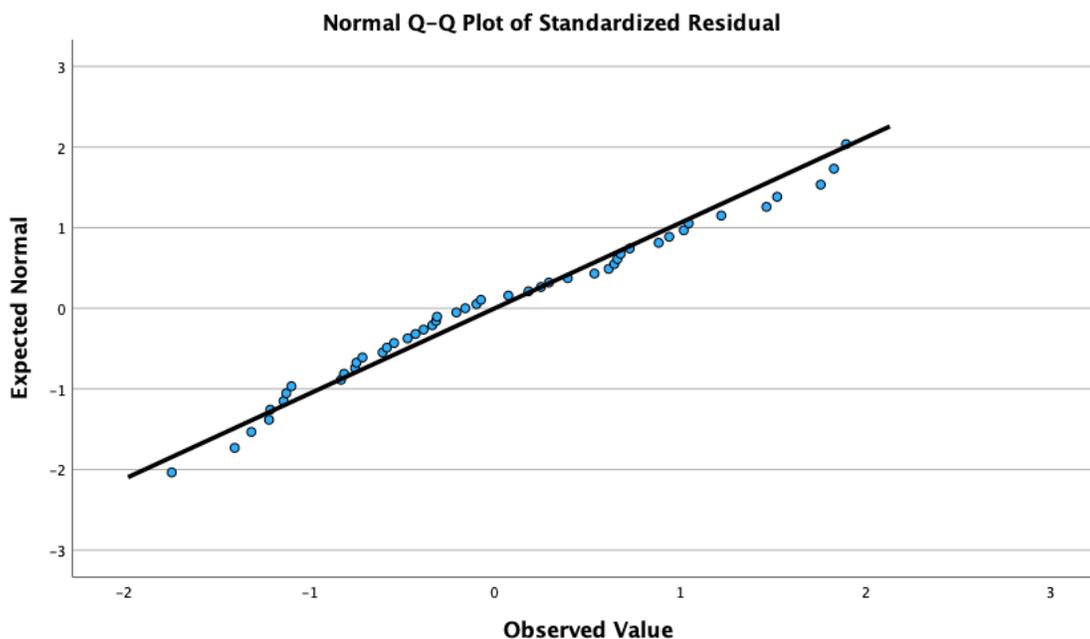
Multivariate outlier detection was conducted using the Mahalanobis distance statistic. A chi-square critical value of $\chi^2(5) = 20.515$ was adopted based on five independent variables at an alpha level of .001. The alpha level was set to .001 to reduce the likelihood of incorrectly classifying a valid data point as an outlier while still identifying truly extreme multivariate cases. The analysis revealed that no cases exceeded this critical value, indicating that the dataset contained no problematic multivariate outliers. Therefore, no cases were excluded on this basis.

Normality

The assumption of normality of residuals was assessed using the Shapiro–Wilk test applied to standardized, unstandardized, and studentized residuals. For the standardized residuals, the Shapiro–Wilk test produced a statistic of .970 ($df = 47, p = .258$). The unstandardized residuals showed identical results, with a Shapiro–Wilk statistic of .970 ($df = 47, p = .258$). For the studentized residuals, the Shapiro–Wilk test yielded a value of .967 ($df = 47, p = .200$). In all cases, the p-values exceeded the conventional alpha level of .05, indicating no significant departure from normality. These results suggested that the residuals were approximately normally distributed, satisfying the normality assumption required for linear regression analysis. Visual inspection of the Q–Q plot for the standardized residuals (Figure 3) supported the findings of the formal normality tests. The plotted points closely followed the reference line representing a normal distribution, with only minor deviations observed at the extreme tails. These slight departures were not substantial and did not indicate a meaningful violation of the normality assumption. The overall clustering of points along the diagonal line suggested that the residuals were approximately normally distributed, confirming that the assumption of normality for multiple linear regression was satisfied.

Figure 3

Normal Q–Q plot of standardized residuals showed approximate alignment with the expected normal distribution



Linearity and Homoscedasticity

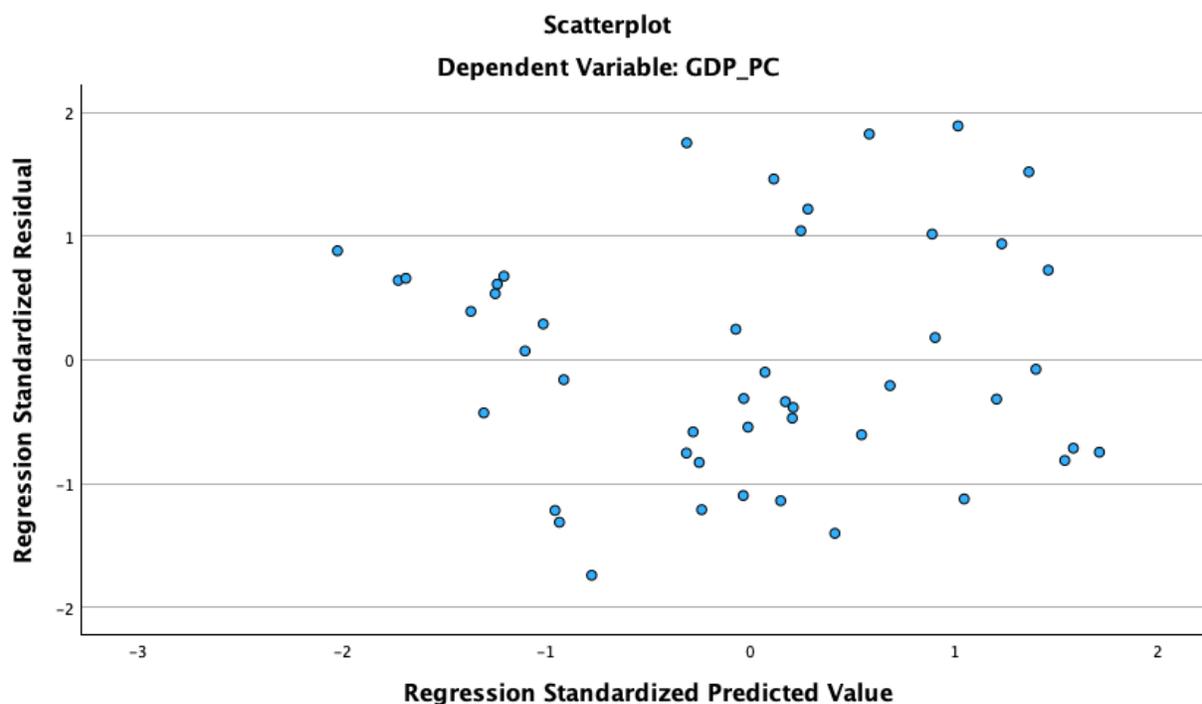
The assumption of linearity held that the relationship between the dependent variable and the combination of independent variables was linear. This assumption was assessed by inspecting a scatterplot of standardized residuals versus standardized predicted values. As shown in Figure 4, the residuals appeared to be randomly dispersed around the horizontal axis, with no discernible curvature or systematic pattern, suggesting that the assumption of linearity was met and that the model was appropriately specified to estimate the relationships among variables.

The assumption of homoscedasticity was also evaluated using the same scatterplot. The spread of residuals appeared relatively constant across the full range of predicted values, with no clear funneling or compression. This indicated that the variance of the residuals was constant,

thus satisfying the assumption of homoscedasticity. Together, the results of these diagnostic checks supported the appropriateness of using multiple linear regression for this analysis.

Figure 4

Scatterplot of standardized residuals versus standardized predicted values demonstrated linearity and homoscedasticity



Multicollinearity

Multicollinearity was assessed using tolerance and variance inflation factor (VIF) values derived from the regression model. Tolerance values ranged from .095 to .753, and VIF values ranged from 1.329 to 10.531. While most predictors fell within acceptable thresholds (Tolerance $> .10$; VIF < 10), Imports of Goods and Services (% of GDP) exhibited a VIF of 10.531 and a Tolerance value of .095, indicating potential multicollinearity concerns. Exports (% of GDP) also showed elevated multicollinearity with a VIF of 5.353 and a Tolerance of .187, as shown in Table 2.

Despite these concerns, all five independent variables were retained in the model due to their theoretical relevance and contribution to the study's central research question. In particular, both Imports and Exports were considered essential components of Egypt's trade openness and economic integration during the study period. As such, the model emphasized the combined explanatory power of the predictors rather than the unique statistical contribution of any single variable.

Table 2

Tolerance and Variance Inflation Factor (VIF) Values from Multiple Linear Regression Predicting GDP per Capita (N = 47)

Predictor	Tolerance	VIF
Remittances (% GDP)	.540	1.851
FDI (% GDP)	.753	1.329
GCF (% GDP)	.307	3.260
Imports (% GDP)	.095	10.531
Exports (% GDP)	.187	5.353

Note. Tolerance values < .10 and VIF values > 10 may indicate multicollinearity concerns

Independence of Errors

The assumption of independence of errors was evaluated using both the Durbin–Watson (DW) statistic and the Breusch–Godfrey (BG) Lagrange Multiplier test across all regression models. The DW statistic tests for first-order autocorrelation in residuals, with values close to 2 indicating no autocorrelation. As shown in Table 3, all models yielded DW values well below the threshold of 2, ranging from 0.011 to 0.563, suggesting strong positive autocorrelation in the residuals.

To further assess serial correlation, the BG test was conducted for each model. The BG test evaluates both first- and higher-order autocorrelation using a Lagrange Multiplier framework. All models produced statistically significant χ^2 values ($p < .001$), confirming the presence of serial correlation.

Given the strong and consistent evidence of autocorrelation, Newey–West standard errors (lag = 1) were applied across all regression models to adjust the standard error estimates for autocorrelation and to ensure the robustness of inference. A lag of 1 was selected to address first-order autocorrelation while preserving estimate reliability, as higher-order lags can lead to instability in small samples ($n = 47$).

Table 3

Durbin–Watson (DW) Statistics for Simple and Multiple Linear Regression Models Predicting GDP per Capita (N = 47)

Subproblem	Predictor	DW	BG Test χ^2	df	p-value
Subproblem 1	GCF	.352	28.72	1	<.001
Subproblem 2	Personal Remittances	.097	39.43	1	<.001
Subproblem 3	FDI	.011	44.17	1	<.001
Subproblem 4	Exports	.065	41.43	1	<.001
Subproblem 5	Imports	.217	35.25	1	<.001
Multiple Linear Regression	GCF, Personal Remittances, FDI, Exports, Imports	.563	24.28	1	<.001
Supplementary Model 1	GCF, FDI, Exports, Imports	.520	24.65	1	<.001
Supplementary Model 2	GCF, FDI, Exports	.527	23.80	1	<.001

Note. DW = Durbin–Watson statistic; values near 2 indicate no autocorrelation. BG = Breusch–Godfrey Lagrange Multiplier test for serial correlation. Significant χ^2 values ($p < .05$) suggest the presence of autocorrelation.

Summary

Assumption testing confirmed that the data met the conditions for conducting multiple linear regression. No problematic univariate or multivariate outliers were identified. One observation, foreign direct investment (FDI) in 2006, exceeded the ± 3.29 Z-score threshold for univariate outliers. However, it was retained due to its alignment with Egypt’s well-documented surge in foreign investment during the mid-2000s, thereby preserving both historical accuracy and analytical continuity. The residuals were found to be approximately normally distributed based on both statistical tests and visual inspection of Q–Q plots. The residual scatterplot indicated that the assumptions of linearity and homoscedasticity were also met. Although multicollinearity diagnostics revealed elevated VIF values for Imports and Exports, these variables were retained in the model due to their theoretical significance to the construct of trade openness.

Finally, ethical compliance and data security protocols were upheld throughout the research process. All data were obtained from publicly available sources, and secure storage and documentation procedures were implemented in line with institutional standards. Diagnostic plots supporting the regression assumptions are presented (see Appendix D).

The findings from these preliminary analyses provided a strong foundation for the regression results and their interpretation, which were discussed in detail in Chapter 5.

Subproblem 1: Gross Capital Formation in Egypt (1977-2023)

Subproblem 1 examined the level and characteristics of gross capital formation in Egypt over the 47-year period from 1977 to 2023. As shown in Table 4, the mean value of gross capital

formation was $M = 21.53$ percent of GDP, with a standard deviation of 5.86 percent. The median was 19.56 percent, and the observed values ranged from a minimum of 12.88 percent to a maximum of 33.12 percent, yielding a total range of 20.24 percentage points.

A simple linear regression was conducted to examine whether gross capital formation (% of GDP) significantly predicted GDP per capita (constant 2015 US\$) in Egypt from 1977 to 2023. The overall regression model was statistically significant, $F(1, 45) = 69.45$, $p < .001$, and explained approximately 61.4% of the variance in GDP per capita, $R^2 = .614$, Adjusted $R^2 = .605$.

Gross capital formation was found to be a significant negative predictor of GDP per capita, $B = -107.05$, $t(45) = -8.33$, $p < .001$, indicating that, on average, each one-percentage-point increase in gross capital formation (% of GDP) was associated with a \$107.05 decrease in GDP per capita.

These results suggested an inverse relationship between gross capital formation and GDP per capita during the period studied.

Table 4

Descriptive statistics for gross capital formation (1977 – 2023)

Statistic	Value
Mean (M)	21.53%
Standard Deviation (SD)	5.86%
Median	19.56%
Minimum	12.88%
Maximum	33.12%
Range	20.24%

Note. Values represent gross capital formation as a percentage of GDP

Table 5

Simple Linear Regression Results for gross capital formation predicting GDP per capita (1977-2023)

Predictor	B	β	SE (Newey)	$t(45)$	p
GCF	-107.05	-.783	12.85	-8.33	<.001

Note. GDP per capita is measured in constant 2015 U.S. dollars. Gross capital formation is expressed as a percentage of GDP. $N = 47$. Standard errors are based on Newey–West corrections (lag = 1).

Subproblem 2: Personal Remittances in Egypt (1977-2023)

Subproblem 2 examined the level and characteristics of personal remittances received in Egypt across the 47-year period from 1977 to 2023. As shown in Table 6, the mean value of personal remittances was $M = 7.31$ percent of GDP, with a standard deviation of $SD = 3.01$ percent. The median was 6.40 percent, and observed values ranged from a minimum of 2.86 percent to a maximum of 14.58 percent, yielding a total range of 11.73 percentage points.

A simple linear regression was conducted to determine whether personal remittances (% of GDP) significantly predicted GDP per capita (constant 2015 US\$) in Egypt from 1977 to 2023. The model was statistically significant, $F(1, 45) = 10.41$, $p = .002$, and explained approximately 17.7% of the variance in GDP per capita, $R^2 = .177$, Adjusted $R^2 = .159$.

Remittances were found to be a significant negative predictor of GDP per capita, $B = -112.14$, $t(45) = -3.23$, $p = .002$, indicating that each one-percentage-point increase in personal remittances as a share of GDP was associated with a \$112.14 decrease in GDP per capita.

Table 6

Descriptive statistics for personal remittances (1977 – 2023)

Statistic	Value
Mean (M)	7.31%
Standard Deviation (SD)	3.01%
Median	6.40%
Minimum	2.86%
Maximum	14.58%
Range	11.73%

Note. Values represent personal remittances received as a percentage of GDP.

Table 7

Simple Linear Regression results for personal remittances predicting GDP per capita (1977-2023)

Predictor	<i>B</i>	β	<i>SE (Newey)</i>	<i>t(45)</i>	<i>p</i>
Remit	-112.14	-.421	34.75	-3.23	.002

Note. GDP per capita is measured in constant 2015 U.S. dollars. Personal remittances are expressed as a percentage of GDP. $N = 47$. Standard errors are based on Newey–West corrections (lag = 1).

Subproblem 3: Foreign Direct Investment in Egypt (1977-2023)

Subproblem 3 examined the level and characteristics of foreign direct investment (FDI) in Egypt over the 47-year period from 1977 to 2023. As shown in Table 8, the mean value of FDI was $M = 2.41$ percent of GDP, with a standard deviation of $SD = 2.01$ percent. The median was 2.10 percent, and observed values ranged from a minimum of -0.20 percent to a maximum of 9.35 percent, resulting in a range of 9.55 percentage points.

A simple linear regression was conducted to assess whether foreign direct investment (FDI, % of GDP) significantly predicted GDP per capita (constant 2015 US\$) in Egypt from 1977 to 2023. The overall model was not statistically significant, $F(1, 45) = 0.19$, $p = .664$, and explained only 0.3% of the variance, $R^2 = .003$, Adjusted $R^2 = -.020$. The regression coefficient for FDI was not significant, $B = 20.21$, $t(45) = 0.44$, $p = .664$, indicating that foreign direct investment was not a meaningful predictor of GDP per capita during the study period.

Table 8

Descriptive statistics for foreign direct investment (1977 – 2023)

Statistic	<i>Value</i>
Mean (M)	2.41%
Standard Deviation (SD)	2.01%
Median	2.10%
Minimum	-0.20%
Maximum	9.35%
Range	9.55%

Note. Values represent foreign direct investment as a percentage of GDP.

Table 9

Simple Linear Regression results for foreign direct investment predicting GDP per capita (1977-2023)

Predictor	B	β	SE (Newey)	$t(45)$	p
FDI	20.21	.051	46.23	.44	.664

Note. GDP per capita is measured in constant 2015 U.S. dollars. Foreign direct investment is expressed as a percentage of GDP. $N = 47$. Standard errors are based on Newey–West corrections (lag = 1).

Subproblem 4: Exports in Egypt (1977-2023)

Subproblem 4 examined the level and distribution of exports of goods and services in Egypt from 1977 to 2023. As shown in Table 10, the mean value of exports was $M = 20.59$ percent of GDP, with a standard deviation of $SD = 5.97$ percent. The median was 19.90 percent, with values ranging from a minimum of 10.35 percent to a maximum of 33.04 percent, producing a total range of 22.70 percentage points.

A simple linear regression was conducted to examine whether exports of goods and services (% of GDP) significantly predicted GDP per capita (constant 2015 US\$) in Egypt from 1977 to 2023. The model was statistically significant, $F(1, 45) = 4.27$, $p = .045$, and accounted for approximately 14.7% of the variance, $R^2 = .147$, Adjusted $R^2 = .128$. Exports were a significant negative predictor of GDP per capita, $B = -51.50$, $t(45) = -2.07$, $p = .045$, suggesting that each one-percentage-point increase in exports was associated with a \$51.50 decrease in GDP per capita.

Table 10

Descriptive statistics for exports of goods and services in Egypt (1977 – 2023)

Statistic	Value
Mean (M)	20.59%
Standard Deviation (SD)	5.97%

Median	19.90%
Minimum	10.35%
Maximum	33.04%
Range	22.70%

Note. Values represent exports of goods and services as a percentage of GDP.

Table 11

Simple Linear Regression results for exports of goods and services predicting GDP per capita (1977-2023)

Predictor	<i>B</i>	β	<i>SE (Newey)</i>	<i>t(45)</i>	<i>p</i>
Exports	-51.50	-.384	24.91	-2.07	.045

Note. GDP per capita is measured in constant 2015 U.S. dollars. Exports are expressed as a percentage of GDP. $N = 47$. Standard errors are based on Newey–West corrections (lag = 1).

Subproblem 5: Imports in Egypt (1977-2023)

Subproblem 5 examined the level and distribution of imports of goods and services in Egypt over the 47-year period from 1977 to 2023. As shown in Table 12, the mean value of imports was $M = 28.52$ percent of GDP, with a standard deviation of $SD = 6.36$ percent. The median was 27.82 percent, and observed values ranged from a minimum of 19.30 percent to a maximum of 43.50 percent, resulting in a total range of 24.20 percentage points.

A simple linear regression was conducted to determine whether imports of goods and services (% of GDP) significantly predicted GDP per capita (constant 2015 US\$) in Egypt from 1977 to 2023. The model was statistically significant, $F(1, 45) = 20.08$, $p < .001$, and accounted for approximately 37.4% of the variance, $R^2 = .374$, Adjusted $R^2 = .360$. Imports were a significant negative predictor of GDP per capita, $B = -76.90$, $t(45) = -4.48$, $p < .001$, indicating that each one-percentage-point increase in imports was associated with a \$76.90 decrease in GDP per capita.

Table 12

Descriptive statistics for imports of goods and services in Egypt (1977 – 2023)

Statistic	<i>Value</i>
Mean (M)	28.52%

Standard Deviation (SD)	6.36%
Median	27.82%
Minimum	19.30%
Maximum	43.50%
Range	24.20%

Note. Values represent imports of goods and services as a percentage of GDP.

Table 13

Simple Linear Regression results for imports of goods and services predicting GDP per capita (1977-2023)

Predictor	B	β	SE (Newey)	$t(45)$	p
Imports	-76.90	-.611	17.16	-4.48	<.001

Note. GDP per capita is measured in constant 2015 U.S. dollars. Imports are expressed as a percentage of GDP. $N = 47$. Standard errors are based on Newey–West corrections (lag = 1).

Subproblem 6: GDP per capita in Egypt (1977-2023)

Subproblem 6 examined the level and distribution of GDP per capita in Egypt across the 47-year period from 1977 to 2023. As shown in Table 14, the mean GDP per capita (measured in constant 2015 U.S. dollars) was $M = \$2,517.08$, with a standard deviation of $SD = \$800.37$. The median was \$2,458.61, with observed values ranging from a minimum of \$1,235.70 to a maximum of \$4,111.25. This produced a total range of \$2,875.55. Following the descriptive analysis of each study variable, the next section presents the results of the multiple linear regression used to address the primary research question.

Table 14

Descriptive statistics for GDP per capita in Egypt (1977 – 2023)

Statistic	Value
Mean (M)	\$2,517.08
Standard Deviation (SD)	\$800.37
Median	\$2,458.61
Minimum	\$1,235.70
Maximum	\$4,111.25
Range	\$2,875.55

Note. GDP per capita is measured in constant 2015 U.S. dollars.

Subproblem 7: Predicting GDP per capita in Egypt (1977 – 2023)

Subproblem 7 addressed the study’s primary research question by evaluating the predictive relationship between five independent economic indicators—gross capital formation, personal remittances, foreign direct investment, exports, and imports—and the dependent variable, GDP per capita (measured in constant 2015 U.S. dollars). A multiple linear regression analysis was conducted using Newey–West standard errors (lag = 1) in StataNow Basic Edition 19.5 to correct for heteroskedasticity and autocorrelation. As SPSS does not support Newey–West adjustments, Stata was utilized to ensure robust and reliable standard error estimates.

As shown in Table 15, the primary multiple regression model was statistically significant, $F(5, 41) = 22.38, p < .001$, and explained approximately 71.5% of the variance in GDP per capita (Adjusted $R^2 = .715$), indicating a strong model fit. The unadjusted R^2 was .746.

As shown in Table 17, gross capital formation was a significant negative predictor of GDP per capita, $t(41) = -8.48, p < .001$, with a standardized coefficient of $\beta = -.878$. Foreign direct investment was also a significant positive predictor, $t(41) = 3.40, p = .002$, with $\beta = .336$. Exports were a significant negative predictor, $t(41) = -2.54, p = .015$, with $\beta = -.445$. In contrast, personal remittances ($t(41) = 0.56, p = .581$) and imports ($t(41) = 0.63, p = .532$) were not statistically significant predictors. Standardized coefficients (β) are based on the original OLS regression; Newey–West standard errors (lag = 1) were used for significance testing.

The standard error of the estimate was \$427.02, suggesting that, on average, the model’s predicted values of GDP per capita deviated from the actual values by approximately \$427.

Table 15

Model Summary for the Primary Regression Predicting GDP per capita (N = 47)

Statistic	Value
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R	.864
R ²	.746
Adjusted R ²	.715

Note. The dependent variable is GDP per capita (constant 2015 U.S. dollars). Model summary statistics (R, R², Adjusted R²) are based on OLS regression estimates. Coefficient standard errors and significance tests are reported separately using Newey–West corrections (lag = 1).

Table 16

ANOVA Results for the Primary Model Predicting GDP per Capita (N = 47)

Source	<i>df</i>	<i>F</i>	<i>p</i>
Regression	5	22.38	<.001
Residual	41		
Total	46		

Note. DV = GDP per capita (constant 2015 U.S. dollars); predictors = gross capital formation (GCF), personal remittances, foreign direct investment (FDI), exports, and imports. The sum of squares and mean squares are not presented because Newey–West standard errors (lag = 1) were used for coefficient inference.

Table 17

Regression Coefficients for Predictors of GDP per Capita, Primary Model (N=47)

Predictor	<i>B</i>	<i>SE (Newey)</i>	<i>t(41)</i>	<i>p</i>
Constant	5281.38	390.11	13.54	< .001
GCF	-119.97	14.14	-8.48	< .001
FDI	133.73	39.36	3.40	.002
Exports	-59.72	23.53	-2.54	.015
Remittances	18.03	32.44	0.56	.581
Imports	20.80	33.01	0.63	.532

Note. GDP per capita is measured in constant 2015 U.S. dollars. All predictors are expressed as a percentage of GDP. Standard errors are based on Newey–West corrections (lag = 1).

Based on the unstandardized coefficients, the final regression equation for predicting GDP per capita was:

$$GDP\ per\ capita = 5281.38 + 133.73(FDI) - 119.97(GCF) - 59.72(Exports)$$

Summary

In summary, gross capital formation and exports were negatively associated with GDP per capita, while foreign direct investment showed a positive relationship. Personal remittances and imports were not statistically significant. These findings supported the overall model's

robustness and predictive power. Detailed results for individual predictors were reported in Subproblems 1 through 6.

Supplemental Analysis

Two supplemental models were estimated to assess the robustness and parsimony of the primary regression model. Specifically, personal remittances and imports, both statistically non-significant in the primary regression model, were sequentially removed. The goal was to determine whether the remaining predictors continued to explain GDP per capita effectively and whether a more parsimonious model retained comparable explanatory power.

Supplementary Model 1: Excluding Personal Remittances

To test the robustness of the primary model, a supplementary regression was estimated excluding personal remittances, which were statistically non-significant in the original specification. Supplementary Model 1 retained four predictors: gross capital formation, foreign direct investment, exports, and imports. The objective was to evaluate whether removing remittances would improve model fit or affect the significance and predictive strength of the remaining variables.

As shown in Table 18, Supplementary Model 1 was statistically significant, $F(4, 42) = 27.76, p < .001$, and explained approximately 71.9% of the variance in GDP per capita (Adjusted $R^2 = .719$), indicating a strong model fit. The unadjusted R^2 was .744, and the standard error of the estimate decreased slightly to \$423.96. Given prior evidence of serial correlation, Newey–West standard errors (lag = 1) were applied to ensure robust inference.

Gross capital formation remained a strong and statistically significant negative predictor of GDP per capita, $t(42) = -8.52, p < .001, \beta = -.876$. Foreign direct investment continued to be a significant positive predictor, $t(42) = 3.52, p = .001, \beta = .324$. Exports also maintained a

statistically significant negative relationship, $t(42) = -3.02$, $p = .004$, $\beta = -.481$. Imports were not a statistically significant predictor, $t(42) = 1.18$, $p = .246$. Standardized coefficients (β) are based on the original OLS regression.

After excluding personal remittances, the adjusted R^2 increased from .715 in the primary model to .719 in Supplementary Model 1, indicating a slight improvement in model fit and supporting the robustness and parsimony of the revised specification.

Table 18

Model Summary for Supplementary Model 1 Predicting GDP per capita (N = 47)

Statistic	Value
R	.862
R ²	.744
Adjusted R ²	.719

Note. The dependent variable is GDP per capita (constant 2015 U.S. dollars). Model summary statistics (R, R², Adjusted R²) are based on OLS regression estimates. Coefficient standard errors and significance tests are reported separately using Newey–West corrections (lag = 1).

Table 19

ANOVA Results for the Supplementary Model 1 Predicting GDP per Capita (N = 47)

Source	df	F	p
Regression	4	27.76	<.001
Residual	42		
Total	46		

Note. DV = GDP per capita (constant 2015 U.S. dollars); predictors = gross capital formation (GCF), foreign direct investment (FDI), exports, and imports. The sum of squares and mean squares are not presented because Newey–West standard errors (lag = 1) were used for coefficient inference.

Table 20

Regression Coefficients for Supplementary Model 1 Predicting GDP per Capita (N=47)

Predictor	B	SE (Newey)	t(42)	p
Constant	5267.33	383.96	13.72	< .001
GCF	-119.72	14.05	-8.52	< .001
FDI	129.13	36.70	3.52	.001
Exports	-64.58	21.35	-3.02	.004
Imports	29.62	25.17	1.18	.246

Note. GDP per capita is measured in constant 2015 U.S. dollars. All predictors are expressed as a percentage of GDP. Standard errors are based on Newey–West corrections (lag = 1).

Supplementary Model 2: Excluding Personal Remittances and Imports

To further assess the robustness and parsimony of the primary model, Supplementary Model 2 was estimated by excluding both personal remittances and imports, as neither variable was statistically significant in earlier analyses. This reduced model retained only the three previously significant predictors: gross capital formation, foreign direct investment, and exports. The objective was to determine whether a more streamlined model could maintain comparable explanatory power and reinforce the stability of the key relationships.

As shown in Table 21, Supplementary Model 2 was statistically significant, $F(3, 43) = 30.67$, $p < .001$, and explained approximately 71.9% of the variance in GDP per capita (Adjusted $R^2 = .719$), indicating a strong model fit. The unadjusted R^2 was .737, and the standard error of the estimate was \$424.28, nearly identical to the previous model. To account for autocorrelation identified in earlier diagnostic tests, Newey–West standard errors (lag = 1) were used to ensure robust inference.

All three predictors remained statistically significant. Gross capital formation continued to demonstrate a strong negative association with GDP per capita, $t(43) = -8.77$, $p < .001$, $\beta = -.757$. Foreign direct investment retained its positive effect, $t(43) = 3.43$, $p = .001$, $\beta = .337$, and exports maintained a significant negative relationship, $t(43) = -3.54$, $p = .001$, $\beta = -.330$. Standardized coefficients (β) are based on the original OLS regression, while statistical significance was evaluated using Newey–West standard errors.

Compared to the primary model, which included five predictors, and Supplementary Model 1, which excluded only remittances, this model offered nearly identical explanatory power, as shown in Table 24. The consistency of adjusted R^2 and stability of key coefficients

across all three models reinforces the robustness of gross capital formation, foreign direct investment, and exports as predictors of GDP per capita in Egypt. These findings support the use of a more parsimonious specification that improves model clarity without sacrificing explanatory value.

Table 21

Model Summary for Supplementary Model 2 Predicting GDP per Capita (N = 47)

Statistic	Value
R	.859
R ²	.737
Adjusted R ²	.719

Note. The dependent variable is GDP per capita (constant 2015 U.S. dollars). Model summary statistics (R, R², Adjusted R²) are based on OLS regression estimates. Coefficient standard errors and significance tests are reported separately using Newey–West corrections (lag = 1).

Table 22

ANOVA Results for Supplementary Model 2 Predicting GDP per Capita (N = 47)

Source	df	F	p
Regression	3	30.67	<.001
Residual	43		
Total	46		

Note. DV = GDP per capita (constant 2015 U.S. dollars); predictors = gross capital formation (GCF), foreign direct investment (FDI), exports, and imports. The sum of squares and mean squares are not presented because Newey–West standard errors (lag = 1) were used for coefficient inference.

Table 23

Regression coefficients for Supplementary Model 2 predicting GDP per capita (N=47)

Predictor	B	SE (Newey)	t(43)	p
Constant	5333.12	354.95	15.02	< .001
GCF	-103.48	11.80	-8.77	< .001
FDI	134.14	39.10	3.43	.001
Exports	-44.30	12.52	-3.54	.001

Note. GDP per capita is measured in constant 2015 U.S. dollars. All predictors are expressed as a percentage of GDP. Standard errors are based on Newey–West corrections (lag = 1).

Table 24

Comparison of Primary Model, Supplementary Model 1, and Supplementary Model 2 Regression Results Predicting GDP per capita (N=47)

Model	<i>Predictors Included</i>	<i>R</i>	<i>R</i> ²	<i>Adj. R</i> ²	<i>F</i>	<i>p</i>
Primary	GCF, FDI, Exports, Imports, Remittances	.864	.746	.715	22.38	<.001
Supplementary Model 1	GCF, FDI, Exports, Imports	.862	.744	.719	27.76	<.001
Supplementary Model 2	GCF, FDI, Exports	.859	.737	.719	30.67	<.001

Note. DV = GDP per capita (constant 2015 U.S. dollars). GCF = Gross Capital Formation; FDI = Foreign Direct Investment. All predictors are expressed as a percentage of GDP.

Complete regression output tables for all models are available (see Appendix E).

Chapter Five

Discussion

Introduction

This study examined whether gross capital formation, personal remittances, foreign direct investment, exports, and imports collectively predicted GDP per capita in Egypt from 1977 to 2023, grounded in the theoretical framework of Modernization Theory. Using multiple linear regression applied to a longitudinal dataset of 47 annual observations, the analysis evaluated the significance of each predictor variable's association with economic performance, as measured in constant 2015 U.S. dollar GDP per capita.

Based on the results, the null hypothesis (H_0), that gross capital formation, personal remittances, foreign direct investment, exports, and imports do not predict GDP per capita in Egypt, was rejected in favor of the alternative hypothesis (H_a). The full model was statistically significant, $F(5, 41) = 22.38, p < .001$, and explained approximately 71.5% of the variance ($R^2 = .746$, Adjusted $R^2 = .715$). However, the predictors showed mixed effects. While foreign direct investment was a significant positive predictor of income growth, gross capital formation and exports were significant negative predictors. When controlling for the other predictors, personal remittances and imports were not statistically significant; these mixed effects were examined in greater detail in the subsections that follow.

Discussion of Results

This study examined how gross capital formation, personal remittances, foreign direct investment (FDI), exports, and imports predicted GDP per capita in Egypt from 1977 to 2023. While all five variables were expected to contribute positively to income growth, consistent with modernization theory and much of the development literature, the results told a more complex

story. It was critical to underscore that certain variables showed predicted results, others showed counterintuitive effects, and a few were statistically insignificant when all variables were considered together. These findings highlighted the importance of analyzing the data beyond surface-level assumptions and examining how economic inputs functioned within Egypt's unique institutional and structural context.

Gross capital formation (GCF) produced consistent but counterintuitive results relative to theoretical expectations. In the simple regression, GCF was a statistically significant negative predictor of GDP per capita. This negative relationship persisted in the multiple regression models, where GCF exhibited the largest unstandardized coefficient among all predictors. These findings suggested that, contrary to conventional theory, higher levels of GCF investment in Egypt were associated with lower per capita income over the study period. This outcome contrasts to some extent with the expectations of the Neoclassical Growth Model (Solow, 1956; Levine & Renelt, 1992) and with traditional formulations of Modernization Theory (Rostow, 1960).

However, this finding was not entirely unexpected when viewed through the lens of the literature on Egypt. The study conducted by Dobronogov and Iqbal (2005) showed that while Egypt invested heavily in infrastructure and capital-intensive sectors, these investments often failed to generate inclusive growth. Much of this capital was concentrated in politically influenced megaprojects rather than in manufacturing or high-productivity industries. Rodrik (2006) emphasized that capital formation alone was not sufficient; rather, the institutional context and strategic allocation of investments were key to translating capital into growth. Topcu et al. (2020), while focusing on natural resource-based growth, similarly asserted that in low- and middle-income countries, development outcomes hinged on the quality of human capital and

technological capacity, which conditioned the effective use of natural resources. These findings reinforced that unless capital was strategically deployed, increasing investment correlated with lower average income.

Foreign direct investment (FDI) produced mixed results across the two regression models. In the simple regression, FDI was not a statistically significant predictor of GDP per capita, indicating that on its own, FDI did not explain meaningful variation in Egypt's income levels. However, in the full multiple regression models, which controlled for other macroeconomic variables, FDI emerged as a statistically significant positive predictor.

This pattern aligned well with the literature on FDI in Egypt, particularly the findings of Seyoum et al. (2015) and Alaa et al. (2021), which pointed to a long-run positive relationship between FDI and GDP growth. These studies supported the FDI-led growth hypothesis and suggested that FDI contributed not only to capital but also to technology transfer, job creation, and improved efficiency. Given that FDI became significant only when controlling for other variables, its benefits may have been obscured by factors such as domestic investment inefficiency or trade imbalances. Moreover, as Hanafy and Marktanner (2019) underscored, FDI's effectiveness was conditional on its sectoral alignment and its interaction with domestic private investment. Their findings suggested that external capital contributed meaningfully to growth only when it complemented a robust domestic private investment environment, particularly in sectors such as services.

Exports produced consistent statistical results across both models, but these results ran counter to the expectations of modernization theory. In the simple regression, exports were a statistically significant negative predictor of GDP per capita, suggesting that higher export shares were associated with lower income levels. This negative relationship persisted in the full

multiple regression models, where exports remained a statistically significant predictor. These results challenged conventional assumptions about the growth-enhancing effects of exports and suggested that, in Egypt's case, the structure and composition of exports, rather than their volume, may have limited their developmental impact. These results invite a contextual interpretation of trade-led growth theory and prior foundational findings, including Frankel and Romer (1999) and Balassa (1978), which generally report positive export–growth effects. One possible explanation for this result was that Egypt’s export profile had been heavily skewed toward low-value-added goods such as basic agricultural products and raw materials (Ahmed, 2023; Zaki, 2017). As Lederman and Maloney (2003) noted, the composition of exports, not merely their volume, played a critical role in shaping long-term economic outcomes.

Countries that focused on undiversified exports often saw limited developmental returns. Egypt’s failure to shift toward more complex, higher-value sectors may have explained why increasing exports had not produced gains in per capita income. As Soliman (2024) showed, even currency devaluation did little to boost export performance because of structural inefficiencies. This study supported the view that exports could only drive income growth when paired with industrial upgrading and diversification.

Personal remittances produced mixed results across the two regression models. In the simple regression, remittances were a statistically significant negative predictor of GDP per capita, suggesting that higher remittance inflows were associated with lower income levels when considered on their own. However, in the full multiple regression models, after controlling for other macroeconomic factors, remittances were no longer a significant predictor. This shift reflected the findings of several Egypt-specific studies that cautioned against overestimating remittances’ macroeconomic impact. While remittances had the potential to reduce poverty at the

household level (Adams & Page, 2005; Ratha, 2013), their effect on national income appeared more conditional. Qutb (2021) argued that remittances in Egypt were often used for consumption rather than investment, which limited their long-term growth potential. This study's results were consistent with those findings. When controlling for other variables, remittances no longer significantly predicted GDP per capita, implying their effects may have been more stabilizing than transformative. Moreover, studies such as Abdih et al. (2012) and Alamoudi (2024) emphasized the importance of governance. In countries with weak institutions, remittances could reduce pressure for reform by creating a financial cushion for households that substituted remittances for public services.

Imports produced mixed results between the two regression models. In the simple regression, imports were a statistically significant negative predictor of GDP per capita, suggesting a strong inverse relationship between higher import levels and income growth. However, in the full multiple regression models, after controlling for other macroeconomic variables, imports were no longer statistically significant. This shift implied that the apparent benefits of imports may have been contingent on other economic factors. The literature on Egypt's trade structure offered additional insight. The Soliman (2024) study showed that Egypt's import profile was dominated by essential and inelastic goods, such as food, fuel, and raw materials. As a result, rising imports did not necessarily reflect productive investment. Moreover, since many of Egypt's exports were comprised of low-value goods, the country experienced trade deficits, further diminishing the potential of imports to catalyze income growth.

Implications

The results of this study highlight the limits of certain conventional assumptions embedded within the modernization theory. Although modernization theory suggests that rising

levels of investment, trade, and capital flows lead to income growth and institutional development, the Egyptian case suggests that these relationships are far more contingent on governance quality, economic structure, and policy coherence. This study's findings indicate that economic inputs, such as capital formation, exports, and remittances, do not automatically generate prosperity. Instead, the developmental returns on these inputs depend on how they are managed, directed, and absorbed within the domestic economy.

Most notably, the discovery that gross capital formation (GCF) is a strong and consistent negative predictor of GDP per capita across both simple and multiple regression models reveals a fundamental problem in how investment is utilized in Egypt. This outcome reflects a pattern of misaligned investment priorities, where capital has often bypassed high-impact sectors in favor of politically driven or low-productivity initiatives. The implication for Egypt is clear: Without strategic oversight, investment can become a liability rather than an asset. For policymakers, this calls for a critical re-evaluation of public investment priorities, with a shift toward sectors that yield inclusive, innovation-driven growth, such as manufacturing, green technologies, and small- and medium-sized enterprises.

The significance of foreign direct investment (FDI) in the full regression models, contrasted with its insignificance in the simple regression model, underscores the importance of external capital when domestic mechanisms fall short. In Egypt's case, to maximize FDI's developmental impact, Egypt must enhance the institutional conditions that shape how foreign capital is integrated, including regulatory transparency, streamlined business processes, and partnerships that link FDI with domestic supply chains. This finding has implications not only for Egypt but for other middle-income MENA countries that have similarly struggled to translate capital inflows into equitable growth. As competition for global capital intensifies, the ability to

attract productive FDI, particularly in value-added sectors, will be crucial for development in the region.

The diminished significance of remittances in the full model suggests that while these inflows may offer macroeconomic stability and short-term welfare benefits, they are insufficient drivers of long-term income growth. For Egypt, this necessitates a policy shift from merely receiving remittances to strategically guiding their use toward small business development, educational advancement, and long-term savings. Financial instruments such as diaspora bonds and formal remittance accounts can enhance the developmental impact of these inflows. Strengthening institutional frameworks that support transparent and accessible financial services will be essential to ensure that remittances contribute meaningfully to sustainable economic development.

The negative relationship between exports and GDP per capita raises critical concerns about the composition and sophistication of Egypt's export portfolio. While trade openness is often viewed as a driver of growth, Egypt's reliance on low-value exports may limit its ability to reap those benefits. This pattern mirrors broader challenges across the Global South, where many nations remain trapped in low-value commodity-dependent export structures that do little to stimulate structural transformation. In Egypt's case, the effectiveness of export-led growth depends on strengthening the institutional and policy frameworks that support industrial upgrading and diversification, including targeted trade incentives, export-supporting infrastructure, and regulatory alignment that enables firms to move up the value chain.

Similarly, the diminished significance of imports in the full model indicates that Egypt's current import structure does little to stimulate long-term income growth. To enhance the developmental impact of imports, policymakers must adopt an economic model that prioritizes

productive imports, particularly those that complement advanced technologies and supply inputs for domestic manufacturing. At the same time, trade policy should incentivize the local production of basic goods where feasible, reducing reliance on inelastic imports that strain the trade balance. These reforms are essential not only for Egypt but also for other MENA countries heavily dependent on remittances and imported goods, signaling a broader need for enhanced domestic production, institutional resilience, and coherent development policy.

From a broader perspective, the study reinforces the idea that modernization is not automatic or linear. Development outcomes depend on how countries govern and channel their economic resources. For Egypt, this implies that moving from middle-income stagnation to high-income growth will require not just more investment or trade but institutional modernization, evidence-based planning, and strategic prioritization. For the broader MENA region, this study underscores the critical need to match economic inputs with strong institutions and coherent development policies. Only then can nations move beyond growth illusions and toward sustained, inclusive prosperity.

Limitations

Several limitations were identified in this research study. The study focused exclusively on five independent variables: gross capital formation, personal remittances, foreign direct investment, exports, and imports, as predictors of GDP per capita. While these are widely recognized macroeconomic indicators, this selection meant that other relevant variables, such as inflation, education levels, unemployment rates, and corruption indexes, were not included in order to streamline the research focus. The omission of these indicators meant that the model may not have fully captured the broader array of interdependent forces that shaped economic

outcomes in a developing country like Egypt. This limitation, identified at the outset of the research, remained relevant in interpreting the final regression results.

The study spanned the period from 1977 to 2023; data availability influenced the scope of the analysis. In particular, data on personal remittances were not available prior to 1977, necessitating the exclusion of observations from 1970 to 1976 through listwise deletion. While the resulting 47-year sample size was robust, the shortened timeframe modestly limited the original intent to analyze the full economic period in Egypt beginning in 1970, following the presidency of Gamal Abdel Nasser. Nasser, along with Mohamed Naguib, was a central figure in the Free Officers Movement, which overthrew King Farouk and rejected the continued presence of British troops in Egypt.

In addition, every effort was made to screen and clean the data to meet the assumptions of multiple linear regression. However, it is critical to note that potential inaccuracies in World Bank data stemming from variations in national statistical capacity or reporting practices cannot be entirely ruled out.

Future Research

There are several opportunities for future research to expand on these findings as well as address limitations. This study focused on five macroeconomic variables, gross capital formation, personal remittances, foreign direct investment, exports, and imports, as predictors of GDP per capita in Egypt between 1977 and 2023. While this analysis provides meaningful insights into Egypt's economic dynamics over the past five decades, future studies could broaden the analytical scope by incorporating additional macroeconomic and institutional variables. This study intentionally excluded indicators such as inflation, education levels, unemployment rates, and corruption due to the streamlining of the research focus. However, each of these factors may

play a significant role in shaping income levels and long-term growth potential. Subsequent research could test whether the inclusion of these omitted variables alters the strength, direction, or significance of the relationships observed in this study.

In addition, comparative or regional analyses within the MENA region could yield valuable insights. Egypt's experience with externally driven capital flows, domestic investment inefficiencies, and a skewed export profile may reflect broader structural challenges in the region. Cross-country analyses using similar methodologies could assess whether these findings are similar in other countries with comparable institutional and demographic profiles, such as Algeria, Tunisia, Morocco, or Jordan.

Future studies could also investigate post-2023 developments, particularly as Egypt navigates ongoing economic reforms, subsidy adjustments, and shifts in global trade and investment flows. The impacts of recent International Monetary Fund (IMF) agreements, the role of Gulf investments, and Egypt's evolving relationship with China and BRICS partners could form the basis for new longitudinal or event-based analyses.

Conclusion

This study examined how five key macroeconomic variables, gross capital formation, personal remittances, foreign direct investment, exports, and imports, predicted GDP per capita in Egypt from 1977 to 2023. While traditional development theory often assumes that these variables contribute positively to economic growth, the findings revealed a more complex pattern. Most notably, gross capital formation and exports, typically viewed as key catalysts of economic growth, were found to have had negative relationships with income, suggesting that investment inefficiencies and an export composition made up primarily of low-value commodities may have hindered rather than bolstered economic development. Conversely,

foreign direct investment emerged as a significant positive predictor in the full regression models, highlighting the potential of external capital when domestic mechanisms underperformed.

The results challenged the assumption that simply increasing trade or investment would lead to improved economic outcomes in a linear fashion. Instead, these results underscored the importance of institutional quality, sectoral targeting, and strategic resource allocation. For Egypt and countries with similar demographic and structural profiles, economic growth hinges not only on the volume of financial flows but also on the effectiveness with which those flows are deployed. These findings reinforced recent critiques of modernization theory, which argued that economic development was not driven merely by increasing financial inputs or implementing market liberalization policies but rather depended on the ability of institutions to channel these resources into sustained and inclusive growth effectively.

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APPENDICES

APPENDIX A: DATA SOURCES

All data were obtained from the World Bank World Development Indicators database.

- GDP per Capita (constant 2015 US\$): NY.GDP.PCAP.KD
- Gross Capital Formation (% of GDP): NE.GDI.TOTL.ZS
- Personal Remittances Received (% of GDP): BX.TRF.PWKR.DT.GD.ZS
- Foreign Direct Investment (% of GDP): BX.KLT.DINV.WD.GD.ZS
- Exports of Goods and Services (% of GDP): NE.EXP.GNFS.ZS
- Imports of Goods and Services (% of GDP): NE.IMP.GNFS.ZS

APPENDIX B: DESCRIPTION OF VARIABLES

This appendix provides detailed descriptions of all variables used in the analysis. The dataset includes annual observations from 1977 to 2023 for Egypt.

Dependent Variable:

- GDP per Capita (constant 2015 US\$): Represents the average income per person in Egypt, adjusted for inflation and expressed in constant 2015 U.S. dollars.

Independent Variables:

- Gross Capital Formation (% of GDP): Measures the net increase in physical assets within the economy, indicating investment levels.
- Personal Remittances Received (% of GDP): Captures the inflow of money from Egyptian nationals working abroad, expressed as a percentage of GDP.
- Foreign Direct Investment (BoP, net inflows, % of GDP): Indicates the net inflows of investment to acquire lasting management interest in enterprises operating in Egypt.
- Exports of Goods and Services (% of GDP): Reflects the total value of goods and services exported, expressed as a percentage of GDP.
- Imports of Goods and Services (% of GDP): Reflects the total value of goods and services imported, expressed as a percentage of GDP.

APPENDIX C: INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL LETTER

The following letter, dated April 11, 2025, contains the official IRB approval granted by Marywood University's Exempt Review Committee for this study, confirming that the project does not constitute human subjects research. As such, the ERC required no further review, and permission to proceed with the research was granted.



**MARYWOOD UNIVERSITY
EXEMPT REVIEW COMMITTEE**
Immaculata Hall, 2300 Adams Avenue, Scranton, PA 18509

DATE: April 11, 2025
 TO: Shahub Tossi
 FROM: Marywood University Exempt Review Committee
 STUDY TITLE: [2313770-1] *The Impact of Trade Openness and Investment-Related Factors on GDP per Capita in Egypt: A Quantitative Analysis from 1970 to 2023*
 MU ERC #:
 SUBMISSION TYPE: Other
 ACTION: NOT HUMAN SUBJECTS RESEARCH
 DECISION DATE: April 11, 2025

Dear Mr. Tossi:

Thank you for your submission of an Exemption Request for this project. Marywood University's Exempt Review Committee has reviewed your submission and determined that it is **NOT RESEARCH INVOLVING HUMAN SUBJECTS** covered by [45 CFR part 46](#) (see [Human Subject Regulations Decision Chart 1](#)). This is because:

- The activity does not meet the federal definition of research, which is a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge.
- The activity meets the federal definition of research, but not the federal definition of [human subject \[46.102\(e\)\(1\)\]](#), because:

- it does not involve living individuals or secondary information from human subjects.
- it involves living individuals and secondary activities, but will obtain, use, study, analyze, or generate public, not private, information or biospecimens.
- it involves living individuals and secondary activities, and will obtain, use, study, analyze, or generate private information or biospecimens, but information or biospecimens will be gathered by the record holder, who is unaffiliated with the research, in such a manner that the investigator(s) or research team will be unable to individually identify or associate identities with the information or specimens. This is because:
- the investigator(s) will receive completely de-identified data or specimens and will not be given keys or links to coded data, even temporarily. Also, no re-identification via deduction (e.g. combination of demographics with a small population) will be possible.
 - the data or specimens will be coded, but the investigator(s) and record holder will enter into an agreement prohibiting the release of the key to the investigator(s).
 - the data or specimens will be coded, but the record holder has written policies for a repository or data management plan that prohibits the release of the key to any investigator(s).
 - the data or specimens will be coded, but there are other legal requirements prohibiting the release of the key to the investigator(s).

This determination means that no further review is required by our ERC. You may proceed with this project so long as it has not been disapproved by officials of the institution. If any activities or procedures change within the described project, review requirements may be affected, so please notify us prior to initiation of such changes.

If you have any questions, please contact the Research Office at 570-348-6211, x.2418 or irbhelp@marywood.edu.

Please include your study title and IRBNet ID number in all correspondence with this office.

Regards,
Exempt Review Committee

APPENDIX D: ASSUMPTION TESTING OUTPUTS

This appendix contains supporting figures and diagnostic outputs used to assess the assumptions of multiple linear regression, including normality, linearity, homoscedasticity, multicollinearity, and outlier detection.

Figure D1

Histogram of standardized residuals for the dependent variable (GDP per capita), showing approximate normal distribution.

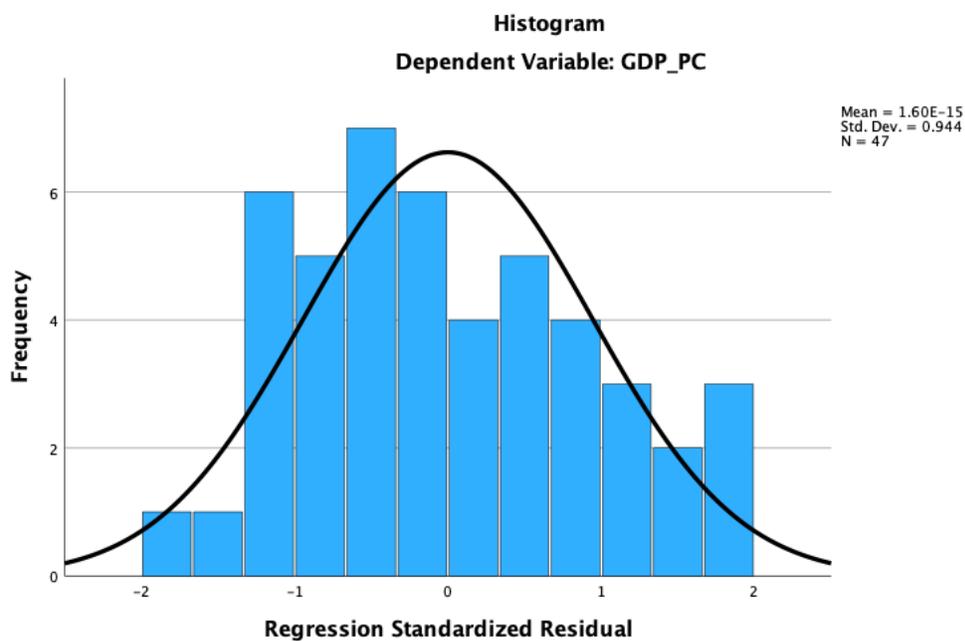


Figure D2

Normal Q-Q plot of standardized residuals, showing approximate alignment with the expected normal distribution

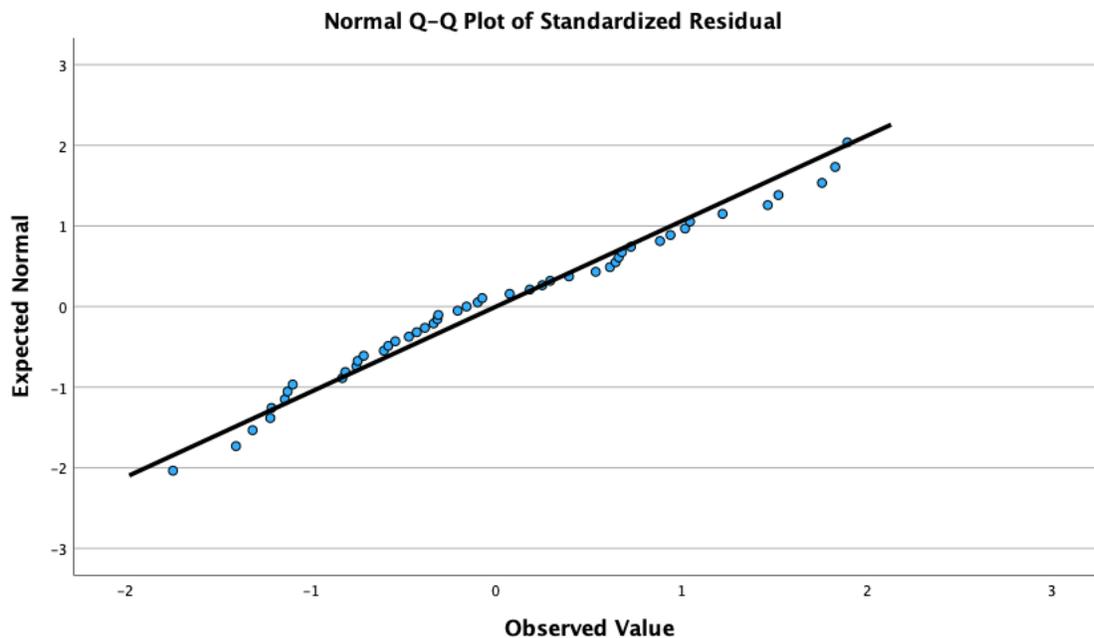
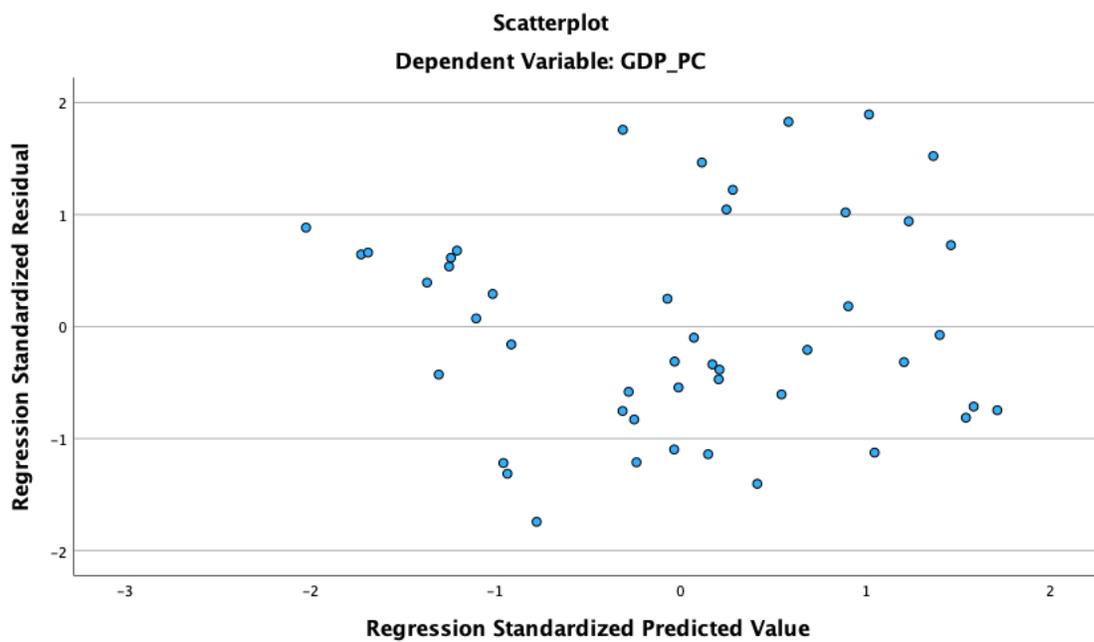


Figure D3

Scatterplot of standardized residuals versus standardized predicted values, demonstrating approximate linearity and homoscedasticity.



APPENDIX E: FULL REGRESSION OUTPUT TABLES

This appendix includes supplementary Stata output tables that support the regression analyses presented in Chapter 4. While selected coefficients, model summaries, and diagnostic statistics are already reported in the main text, the full outputs are provided here for transparency and completeness. These include expanded coefficient tables, collinearity diagnostics, residual statistics, and additional regression model summaries.

Table E1

Stata Output: OLS regression Primary model predicting GDP per capita in Egypt (1977–2023)

Note. Ordinary least squares (OLS) regression model. Dependent variable: GDP per capita (constant 2015 U.S. dollars). Predictors: gross capital formation (GCF), personal remittances, foreign direct investment (FDI), exports, and imports (all expressed as a percentage of GDP).

Primary Model: DV = GDP_PC, IVs: GCF, FDI, Exports, Imports, Remit

`regress GDP_PC GCF Remit FDI Exports Imports`

Source	SS	df	MS	Number of obs	=	47
Model	21991138	5	4398227.61	F(5, 41)	=	24.12
Residual	7476066.72	41	182343.091	Prob > F	=	0.0000
Total	29467204.8	46	640591.408	R-squared	=	0.7463
				Adj R-squared	=	0.7154
				Root MSE	=	427.02

GDP_PC	Coefficient	Std. err.	t	P> t	[95% conf. interval]
GCF	-119.9704	19.40416	-6.18	0.000	-159.1578 -80.78286
Remit	18.02774	28.48597	0.63	0.530	-39.50085 75.55633
FDI	133.7287	36.10253	3.70	0.001	60.81813 206.6392
Exports	-59.71606	24.41287	-2.45	0.019	-109.0189 -10.41326
Imports	20.79788	32.10568	0.65	0.521	-44.04085 85.63662
_cons	5281.379	298.951	17.67	0.000	4677.636 5885.123

Table E2

Stata Output: Durbin–Watson test for first-order autocorrelation (Primary Model, 1977–2023)

Durbin–Watson Test for Primary Model – Showing First Order– Autocorrelation
 Durbin–Watson d–statistic (6, 47) = .5632444

Note. Durbin–Watson d-statistic = 0.56, indicating strong evidence of positive first-order autocorrelation in residuals. Values significantly below 2 suggest positive autocorrelation.

Table E3

Stata Output: Breusch–Godfrey test for higher-order autocorrelation (Primary Model, 1977–2023)

Breusch–Godfrey (BG) test for Primary Model – Test for Autocorrelation			
lags(p)	chi2	df	Prob > chi2
1	24.276	1	0.0000

H0: no serial correlation

Note. Breusch–Godfrey (LM) test statistic: $\chi^2(1) = 24.28$, $p < .001$, indicating presence of serial correlation beyond first order. The null hypothesis of no serial correlation is rejected.

Table E4

Stata Output: OLS regression primary model with Newey–West standard errors predicting GDP per capita (1977 – 2023)

Note. Ordinary least squares (OLS) regression model using Newey–West standard errors to correct for first-order autocorrelation (lag = 1). Dependent variable: GDP per capita (constant 2015 U.S. dollars). Predictors: gross capital formation (GCF), foreign direct investment (FDI), exports, imports, and personal remittances (all expressed as a percentage of GDP).

Primary Model – Standard Error Correction – Newey West						
newey GDP_PC GCF FDI Exports Imports Remit, lag(1)						
Regression with Newey–West standard errors		Number of obs		=	47	
Maximum lag = 1		F(5, 41)		=	22.38	
		Prob > F		=	0.0000	
GDP_PC	Coefficient	Newey–West std. err.	t	P> t	[95% conf. interval]	
GCF	-119.9704	14.13946	-8.48	0.000	-148.5256	-91.41513
FDI	133.7287	39.36464	3.40	0.002	54.23018	213.2272
Exports	-59.71606	23.5292	-2.54	0.015	-107.2343	-12.19787
Imports	20.79788	33.00928	0.63	0.532	-45.86571	87.46148
Remit	18.02774	32.44485	0.56	0.581	-47.49596	83.55144
_cons	5281.379	390.1087	13.54	0.000	4493.539	6069.22

Table E5

Stata Output: Stata output: OLS regression model (Supplemental Model 1) predicting GDP per capita in Egypt (1977–2023)

Note. Ordinary least squares (OLS) regression model excluding personal remittances. Dependent variable: GDP per capita (constant 2015 U.S. dollars). Predictors: gross capital formation (GCF), foreign direct investment (FDI), exports, and imports (all expressed as a percentage of GDP).

```
Supplemental Model 1 : DV = GDP PC, IVs: GCF, FDI, Exports, Imports
regress GDP_PC GCF FDI Exports Imports
```

Source	SS	df	MS	Number of obs	=	47
Model	21918106.6	4	5479526.66	F(4, 42)	=	30.49
Residual	7549098.13	42	179740.432	Prob > F	=	0.0000
Total	29467204.8	46	640591.408	R-squared	=	0.7438
				Adj R-squared	=	0.7194
				Root MSE	=	423.96

GDP_PC	Coefficient	Std. err.	t	P> t	[95% conf. interval]
GCF	-119.7167	19.26107	-6.22	0.000	-158.5871 -80.84628
FDI	129.1349	35.11201	3.68	0.001	58.27604 199.9938
Exports	-64.58489	23.00302	-2.81	0.008	-111.0069 -18.16291
Imports	29.62376	28.71148	1.03	0.308	-28.31835 87.56587
_cons	5267.333	295.9906	17.80	0.000	4670 5864.666

Table E6

Stata Output: Durbin–Watson test for first-order autocorrelation (Supplemental Model 1, 1977–2023)

```
Durbin–Watson Test for Supplemental Model 1 - Showing First Order- Autocorrelation
Durbin–Watson d-statistic( 5, 47) = .520458
```

Note. Durbin–Watson d-statistic = 0.52, indicating strong evidence of positive first-order autocorrelation in residuals. Values significantly below 2 suggest positive autocorrelation.

Table E7

Stata Output: Breusch–Godfrey test for higher-order autocorrelation (Supplemental Model 1, 1977–2023)

Note. Ordinary least squares (OLS) regression model excluding personal remittances and imports. Dependent variable: GDP per capita (constant 2015 U.S. dollars). Predictors: gross capital formation (GCF), foreign direct investment (FDI), and exports (all expressed as a percentage of GDP).

Supplemental Model 2 : DV = GDP PC, IVs: GCF, FDI, Exports,

`regress GDP_PC GCF FDI Exports`

Source	SS	df	MS	Number of obs	=	47
Model	21726762.5	3	7242254.17	F(3, 43)	=	40.23
Residual	7740442.24	43	180010.285	Prob > F	=	0.0000
Total	29467204.8	46	640591.408	R-squared	=	0.7373
				Adj R-squared	=	0.7190
				Root MSE	=	424.28

GDP_PC	Coefficient	Std. err.	t	P> t	[95% conf. interval]
GCF	-103.4811	11.11596	-9.31	0.000	-125.8986 -81.06362
FDI	134.1394	34.80148	3.85	0.000	63.95554 204.3233
Exports	-44.30473	11.95868	-3.70	0.001	-68.42171 -20.18775
_cons	5333.124	289.2575	18.44	0.000	4749.781 5916.468

Table E10

Stata Output: Durbin–Watson test for first-order autocorrelation (Supplemental Model 2, 1977–2023)

Durbin–Watson Test for Supplemental Model 2 - Showing First Order - Autocorrelation
d-statistic(4, 47) = .5270237

Note. Durbin–Watson d-statistic = 0.53, indicating strong evidence of positive first-order autocorrelation in residuals. Values significantly below 2 suggest positive autocorrelation.

Table E11

Stata Output: Breusch–Godfrey test for higher-order autocorrelation (Supplemental Model 2, 1977–2023)

Breusch–Godfrey (BG) test for Supplemental Model 2 - Test for Autocorrelation

lags(p)	chi2	df	Prob > chi2
1	23.801	1	0.0000

Note. Breusch–Godfrey (LM) test statistic: $\chi^2(1) = 23.80$, $p < .001$, indicating presence of serial correlation beyond first order. The null hypothesis of no serial correlation is rejected.

Table E12

Stata output: OLS regression model with Newey–West standard errors (Supplemental Model 2) predicting GDP per capita in Egypt (1977–2023)

```
Supplemental Model 2 - Standard Error Correction - Newey West
newey GDP_PC GCF FDI Exports, lag(1)

Regression with Newey–West standard errors      Number of obs      =      47
Maximum lag = 1                                F( 3, 43)          =      30.67
                                                Prob > F           =      0.0000
```

GDP_PC	Coefficient	Newey–West std. err.	t	P> t	[95% conf. interval]
GCF	-103.4811	11.80454	-8.77	0.000	-127.2872 -79.67498
FDI	134.1394	39.09545	3.43	0.001	55.29592 212.9829
Exports	-44.30473	12.51518	-3.54	0.001	-69.54399 -19.06547
_cons	5333.124	354.9515	15.02	0.000	4617.296 6048.952

Note. Ordinary least squares (OLS) regression model excluding personal remittances and imports, using Newey–West standard errors to correct for first-order autocorrelation (lag = 1). Dependent variable: GDP per capita (constant 2015 U.S. dollars). Predictors: gross capital formation (GCF), foreign direct investment (FDI), and exports (all expressed as a percentage of GDP).